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SPECIAL FEATURES

Glider Pilots—Aces of the Future! - - - - - 35
By William Hawley Bowlus

Sailors Go To Kindergarten! - - - - - - - 42

Fighting The Tuna Pirates! - - - - - - - - 44
By Sterling Gleason

MI Prize Contest - - - - - - - - - - - - 50

They've Loaded Their Trucks With Glamour! - 52
By John T. Lynch

Success Rolled Down His Alley! - - - - - 58

There's An Art To Being An Inventor! - - - - 60
By John G. Copeland

Indian Golf Hits The Bull's-Eye! - - - - - - 68

Under The Hood of the 1941 Cars - - - - - 70
By F. C. Russell

Fortune On The Floor! - - - - - - - - - 76

California Cops Go Back To School! - - - - 78
By Andrew R. Boone

Racing Death Down The Great Lakes! - - - - 84
By Earl W. Gage

(Continued on page 10)

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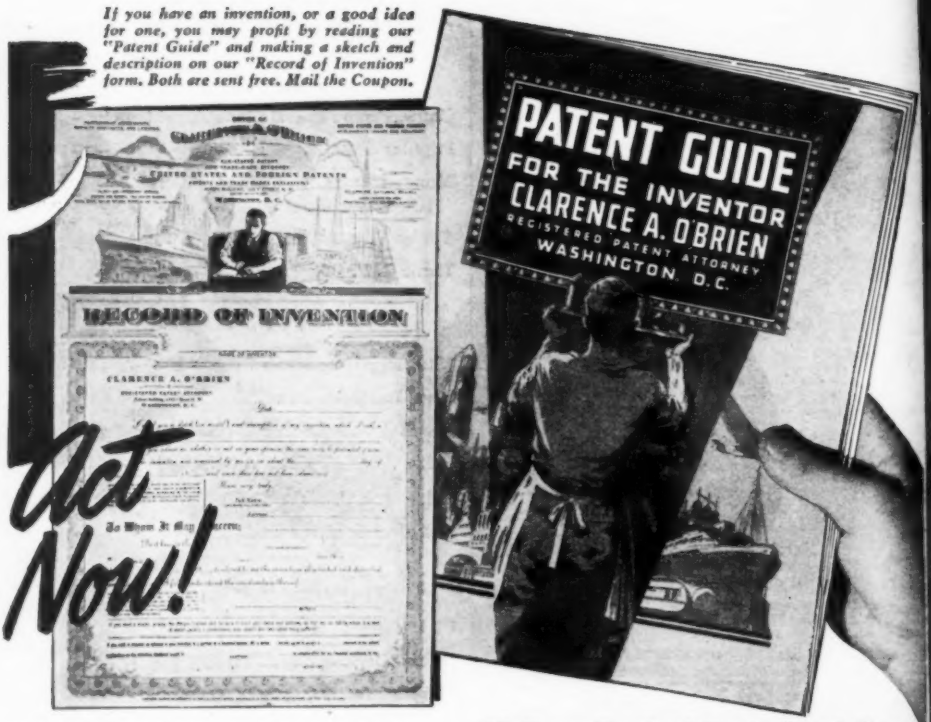

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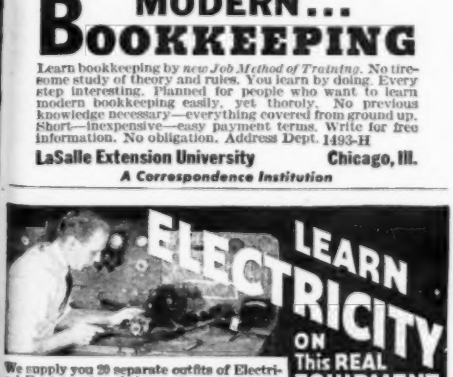

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CONTENTS—Continued from page 4

DEPARTMENTS

Chips From The Editor's Workbench - - 14
Popular Patents - - - - - - - - - - 21
Moneymakers And Moneysavers (Classified Ads) - - - - - - - - - 27
You're Right—That's Wrong! - - - - - 67
Through The Periscope - - - - - - - 136

AVIATION

"Stairstep" For Plane Door - - - - - - 40
Dive Bombers Can Take It! - - - - - - 41
Speed Indicator For Plane Catapults - - 43
Plane Seems To Bee A "Honey" - - - - 49
This Plane Takes A "Bellywhopper" - - - 57
Antiaircraft "Blankout" - - - - - - - 82

NEW MECHANICAL DEVICES

Flip Your Foot To Tune Radio - - - - - 40
Billion Candlepower Secret - - - - - - 41
Mercury Lamp Rivals The Sun - - - - - 41
The First Pretzel Bender - - - - - - - 49
Pigeons Like Machine Age! - - - - - - 59
Special Truck Hauls Big Bombs - - - - 66
Colonel Tickle Builds A Bonnet - - - - 66
Here's Uncle Sam's Newest Scout Car - - 77
Shield Protects Bicyclist - - - - - - - 82

PHOTOGRAPHY

Photo Contest - - - - - - - - - - - - 89
Print Greetings From Christmas Wrappings! 90
By Norman K. Morse
Ken Murray Suggests Kinks - - - - - - 92
"No-Stoop" Tripod Extension - - - - - 93
Portable Studio Light - - - - - - - - 94
By M. G. Winterton

HOW TO BUILD SECTION

Introduction - - - - - - - - - - - - 95
Craft Of Metal Spinning - - - - - - - 96
The "FM-Special" - - - - - - - - - - 98

[*Continued on page* 12]

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CONTENTS—Continued from page 10

HOW TO BUILD SECTION

Turned Candy And Nut Bucket - - - - 104
Smokers' Ash Carts - - - - - - - - 105
Household Kinks - - - - - - - - - 106
Snow And Ice Fun - - - - - - - - 108
Twinkling Christmas Tree Revolves Electrically - - - - - - - 110
For Safe And Handy Home Workshops - - 112
Two-Tone Woodwork With A Blowtorch - 114
"Midgie" Motor Scooter - - - - - - - 116
Novel Ideas For Home Shop Work - - - 120
Reconditioning The Fishing Rod - - - - 122
Tiny Flying Models - - - - - - - - 124
Hints For Model Makers - - - - - - 125
Forend Tips On Gunstocks - - - - - - 126
Decorative Projects From The Workshop - 128

MISCELLANEOUS

Sand For Fallen Arches - - - - - - - 40
Stone Doll Houses Form Model Town - - 43
"Average Man" Is Brainless - - - - - - 49
And They Don't Use A Hairpin - - - - 57
Fire Fighters Look Like Men From Mars - 57
Fuses Are His Hobby - - - - - - - - 59
And They Call Her "Annie Lorrie" - - - 59
Santa Comes To See St. Louis - - - - - 65
Gook And Dum-dum Stop The Noises - - 65
Noah's Ark Modern Style - - - - - - 66
Old Ships Make A Snug Harbor! - - - - 77
The Large And Small Of Army Transports - 77
Aids Air-Raided Airedales - - - - - - 82
Aerial Photos From The Ground - - - - 83
No Boom In This Business - - - - - - 83
Science Restores Dog's Hearing - - - - 88
Cops' Nightmare Does 140 M.P.H. - - - - 88
Biggest Hog Gets Sprinkled - - - - - 88

INVENTORS

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Chips from the Editor's Workbench

AS MANY of our readers know, we've run quite a few yarns in MI on the salvaging of buried and sunken treasure, and, if the news from Washington is any indication, we'll soon be getting a lot more of them. The dope is that the Navy has adopted a new, electrically heated diving suit, insulated with glass cloth, which will enable divers to descend deeper into the sea, stay down longer and retain clear heads much longer than they ever could before.

Formerly, divers used ordinary air, which is just a mixture of oxygen and nitrogen, for breathing under water. To overcome pressure, however, this air has to be compressed considerably, and a bad case of "the bends" sometimes results. In the new suits, a mixture of oxygen and helium is the standard breathing commodity, and, though divers first found that they were much more susceptible to cold with this type of air, the new suits take care of that.

Here you see George Benn, of Ord, Neb., ready to begin a day's work in a tractor he built himself. The single cylinder engine drives the machine at a top speed of 6 m.p.h. and pulls an eight-inch plow to a depth of six inches without the slightest trouble. For this excellent snapshot, George wins a Workbench award of $3.00.

In the latter, the insulation is fibreglas, which is cloth woven of thin glass fibres, and is non-inflammable. The wires are insulated with glass and sewn with glass thread between two layers of fibreglass in the diver's underwear. Which pretty much makes our modern deepsea workers men of glass. Here's hoping they don't trip over any abandoned submarines and fall down and break something.

* * *

THE article by Chief Engineer Johnson of the Lockheed company, appearing in the September, 1940 issue of MI, sort of bowled over reader B. D. Allbaugh, of Klamath Falls, Ore. He writes:

"I am a master mechanic and for the past thirty years have been keeping a scientific and mechanical diary of ideas as they grew in my brain. From this I have developed a prophetic insight into the possibilities of the future. I thought I was way out ahead, but it looks as if the boys are right along and coming.

"I have an entry, not so far back either, on this control of the boundary layer. I visioned this type of wing as one that could be made to do anything a helicopter could do. By means of a slot on leading edge, one underneath and at rear top connected to internal tubes controlled by butterfly valves to a type of high-speed compressor of special design, I visualized a sort of rocket type ship that could rise straight up, hover or go forward at will and I believe it can be accomplished right now.

[*Continued on page* 16]

This graceful little sailboat is a Sunray, Jr., designed by Sam Rabl and described in the No. 4 edition of HOW TO BUILD 20 BOATS. It was built by Milton A. Miner and J. W. Scarbrough, of Menlo Park, Cal., who used only the simplest hand tools such as plane, draw knife, hand drill, saw, hammer, etc. They put about 200 hours into the job. They certainly have earned the $5.00 Workbench check they will receive!

"This boat has been used extensively on lower San Francisco Bay, where a brisk breeze is always to be found," writes Milton. "We have not capsized so far, although from one to four persons have been aboard in all kinds of weather. Here's hoping that Sam Rabl designs more small sailboats and that your magazine publishes the plans."

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A farmer, Joseph Glidden, wanted to protect his fields from wandering cows so he invented and patented the barbed-wire fence. Many inventors live on farms and in small communities and conceive the idea for their inventions from their daily lives.

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Editor's Workbench Chips

[*Continued from page* 14]

"As to the combined gas and steam engine, I submitted an entry of mine to the Navy Board some time ago which consisted of a rotary type of engine in which highly compressed air was heated either externally or internally in a separate container or tank which contained a water spray. I reasoned that the hot air coming in contact with the water spray would form steam and make a combination engine. I thought a better system of energy storage could be had by storing a part of the engine's energy in an insulated tank containing formed steam from the engine. You will recall that you published an article on waterless boilers not so long ago.

"This combined engine came to my mind through experiments with solar energy. I managed to fly a small airplane with sun power about two years ago and I had to develop a rotary type of engine that would run from external heat. I submitted this idea to the Aeronautical Board but they deemed it not of sufficient power for airplanes. But I believe that with the advent of stratosphere flight this idea has great possibilities. By using a compressed-air drive for stratosphere planes in which the air was reheated by the Abbott type sun-power accumulator, additional energy for propulsion could be obtained, and this would be a start which could be the means of further development along this line. I firmly believe that the time will come when we can go for free energy."

* * *

ON PAGE 70 of this issue, you'll find that analytical article on the 1941 automobiles which we told you about last time around. And, before you let your blood pressure get out of hand, and start shouting that the new cars are

This is a De Haviland Gypsy Moth plane on pontoons. It looks real enough until you notice that the propeller is oversize, and then you know that it is a model. It is a very finely made job and has won much praise for its builder, Henry Mayors, 150 Carley Avenue, Huntington, L. I., who also wins a $3.00 Workbench award from MI.

In the picture, the line that appears to be the horizon is actually a sandbar, and the "rocks" at the right are small sea mollusks.

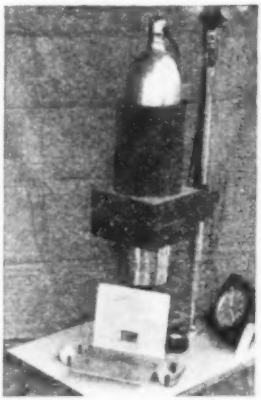
Editor's Workbench Chips

old stuff by now, we want you to remember that this story is just what we said it would be—an analysis of *exactly* what's new in the 1941 jalopies and not what your dealer said was new. This article hasn't got a thing in it about how much more chromium this year's buggies have than was in them last year; it doesn't describe the way the front fenders slope inward 1/335th of an inch more than they did last year, and it isn't a picture story of how different the latest boilers *look* from the way they looked last year. It's just an out-and-out technical discussion of just what improvements actually have been made to increase your riding comfort—and, as such, we think you'll find it well worth your attention, especially if you've been thumbing through your wallet in hopes of finding some extra bucks for a new bus.

* * *

LOVE affairs with planets, rockets and other celestial bodies are not exactly common occurrences, but, since Halley's comet made its first appearence in these parts during the same week as your correspondent, we have always had a warm spot in our heart for Mr. Halley's discovery. That was 30 years ago, but our devotion to comets has grown with the march of time, and even now we sit and watch for the return of the Halley particle at our front door. Perhaps that's why we had more than a passing interest in Whipple's comet, which was discovered last summer by Dr. Fred L. Whipple, of Harvard University, and which was nearest to the sun on Oct. 7 last. By nearest to the sun, we mean approximately 101,000,000 miles, or too far away to be seen with

[*Continued on page* 19]



The "Dustmaster" enlarger described in PHOTOGRAPHY HANDBOOK No. 5 has become very popular with photo fans. Here is one built by Fred S. Jurkowski, Box 151, Pittock, Pa., who writes:

"The plans were well presented and as a result the completed enlarger has surpassed all expectations both in appearance and operation. I incorporated several ideas of my own: a red filter, a mounted luminous electric timing clock, a 35 mm. negative carrier with a tray on each side to keep excess film from unrolling, and finally, a cover for the top box to prevent dust from settling on the mechanism."

This is a rugged looking enlarger, Fred, and you win a $3.00 Workbench award for your nice letter and fine picture.

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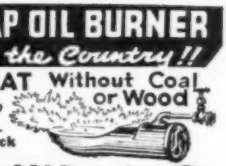

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Editor's Workbench Chips

[*Continued from page 17*]

the naked eye. Since then Dr. Whipple's baby has been disappearing into the southern sky, and no longer can be seen, even with the aid of a high-powered glass. We just thought you'd like to know, in case you were peering through your telescope last Oct. 7 and noticed some object with which you weren't entirely familiar.

* * *

EVER since the first magazine was published, editors have been hoping someone would invent a gadget that would enable them to discover just what was in the readers' minds. Did they like that last article we ran? Do they think we should be getting some other kind of story? Do they like us, or think we're wasting our time?

Frankly, the only sure way we have of knowing whether you like us or not is by the number of you who rush each month to your newsdealer to buy a copy of our latest brainchild. And, even then, we aren't certain whether you're buying MI because of the camera section, the feature stories, the how-to-build-it section, or because you like to read the ads. You could tip us off on these matters, though, by dropping us a line every now and then. Some of you are great letter-writers; but a lot of readers never get in touch with us at all, and those are the ones we'd like to hear from. It gets pretty lonely here in the Great City, you know, and an occasional note from you, telling us what you like or didn't like about our magazine, would do wonders to cheer us up. So, how about it? Why not take pen in hand tonight and open your heart to us? We're great letter-readers.

[*Continued on page 137*]

"Almost as soon as I learned to read I started devouring each issue of MI," writes John L. Ashby, 409 Spring St., Ann Arbor, Mich. "In fact, I have an uninterrupted shelf of ten years straight, from the early MODERN MECHANICS right up to date.

"The above picture of my two dust raisers may be of interest. The small one uses a 1920 Indian twin engine, with one-wheel chain drive. The big one owes its origin to Ray Kuns' article in an old issue on Model T conversion. Had to change the plans a bit to fit the Chevy chassis, but everything else worked out fine."

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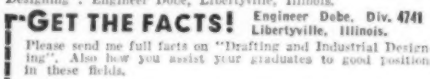

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Popular Patents

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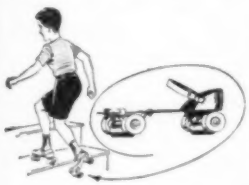

* * *

It is estimated that about an average of one out of five patents is applicable to automobiles.

* * *

An all purpose umbrella and walking stick has been patented recently. The handle of this novel contrivance carries a cigarette case, cigarette lighter, batteries, bulb and lens for an electric flashlight, a drinking cup, magnifying glass, and container for miscellaneous objects, a metal fishing rod, and a camera supporting element. A hollow knob at the end of the handle serves as a drinking cup. This cup is made at the bottom in the form of a magnifying glass. In the top flat part of the handle a miscellaneous container is located, and between this container and the cup portion there is a cigarette lighter. A package of cigarettes is held in the top of the handle which fastens to the central piece of the umbrella. A flat cover is hinged on top of the handle and this cover is marked to serve as a ruler. A mirror extends from the end of this ruler, the under face of the mirror being adapted to serve as a memo pad. Near the hinge, and extending through the ruler cover, a screw thread is provided to attach a camera when the cane is used as a tripod. Beneath the package of cigarettes there is an electric bulb which lights up a carved face in the handle. Dry cell batteries are provided beneath the bulb. A series of tripod legs are hinged to the handle for photographic purposes; while a fishing rod is situated in the central tube of the umbrella. Yes, this invention is also used for protection against rain.

* * *

Five inventors soon will make their appearance on postage stamps. They are Eli Whitney, cotton gin; Elias Howe, sewing machine; Alexander Graham Bell, telephone; Samuel Morse, telegraph, and Cyrus McCormick, reaper.

[*Continued on page 25*]

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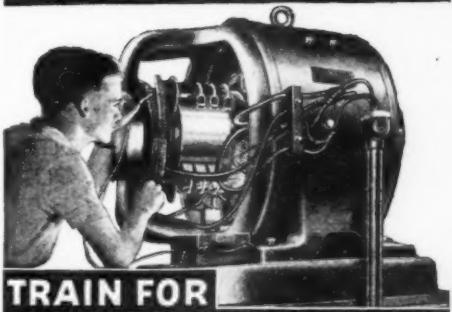

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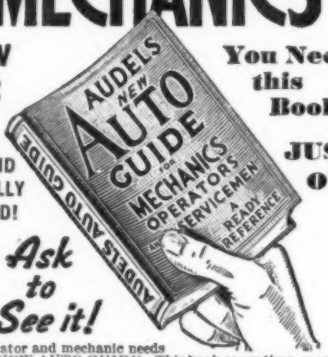

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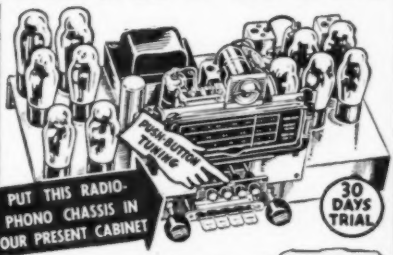

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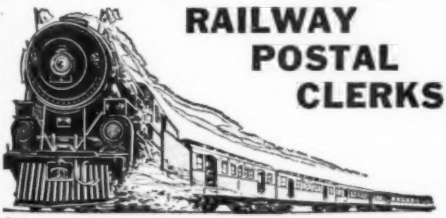

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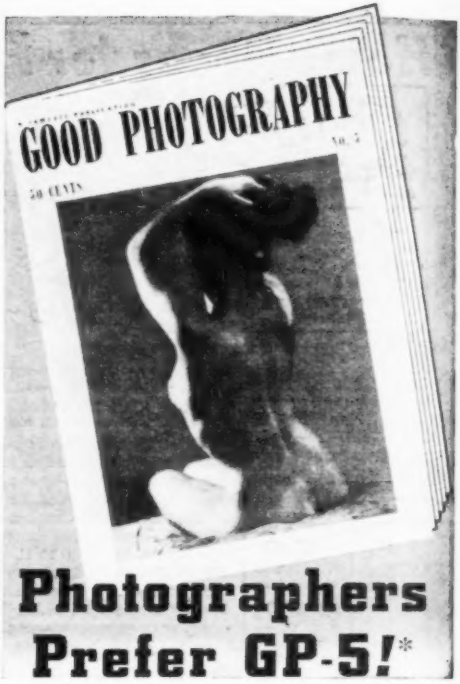

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Popular Patents

[*Continued from page 21*]

For blowing several bubbles at one time, one within another, an inventor has devised a blower having a series of concentric dish shaped parts, with an air flow passage leading from the handle through each part. Each circular part is at a level different from the others.

* * *

Approximately 20,000 patents have been granted to women inventors. It is estimated that about 1 patent in every 70 is issued to a woman.

The flying bat might well illustrate a new invention for skiing. The novel device consists of a cloak-line garment secured along the arms and legs of the skier and so cut that when the skier stretches out his arms a triangular shaped sail is spread out between the hands and the legs. The hands themselves are left free to hold the skiing sticks in the usual manner. This sheet acts as an air baffle to brake the speed of the skier. It also simplifies the making of turns. By bringing the arms together or to the side of the body, the sheet collapses and does not interfere with the speed of the skier. The inventor also points out that by using the new sail, greater ski jumps may be made.

* * *

Neon lamps for automobile lighting systems are disclosed in a newly granted patent. According to the inventor headlights are replaced by neon tubes. The tubes are also used around the radiator to outline the radiator design. The tubes may also be placed along the running board and around the license plates. Good visibility without glare is claimed by the new invention. Conventional automobile batteries are not suitable for the new tubes. A transformer is needed in the circuit if the neon tubes are employed.

[*Continued on page 33*]

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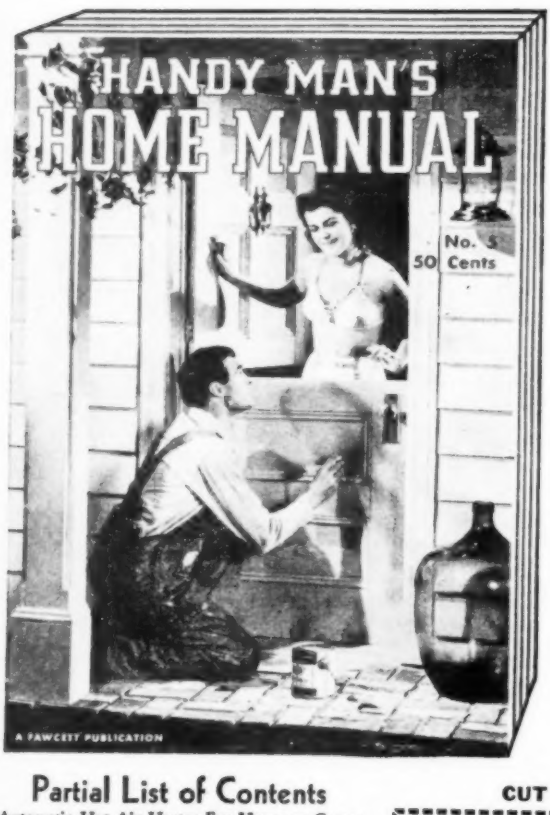

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Popular Patents

[*Continued from page 25*]

For supporting a golf bag, an inventor has provided two legs which are joined by a hinge through a loop or ring in the bag. When the bag and legs are lifted, the legs fold together and hang along the side of the bag.

* * *

Miss Beulah Henry of New York City is known as the lady Edison due to her patent activity. She has been granted 60 patents.

* * *

A convenient method of serving hot refreshments while entertaining guests in the living room is provided by a novel combination floor lamp and electric cooker. The pedestal of the lamp is bent to permit a dish-shaped electric heating unit to be fastened at a suitable height to the base. The switch may be arranged as a four way switch to control the circuit of the lamp socket and the heating element. Such a switch permits the lamp or the heater to be used independently or both together. The novel lamp is said to have particular utility for preparing meals for bedridden persons.

* * *

Other recent patents include an anti-skid device for automobiles . . . a trick mirror for displaying one side of a face and the reflection of that side instead of the hidden side . . . an electric calf weaner which shocks both calf and cow when the nose of the calf touches the cow . . . and an automobile with a removable steering column and folding seats for sleeping inside the car.

—*Morton Leese.*

* * *

Patents Identified

	No.		No.
Roller Skate	2,208,888	Golf Bag	2,214,579
Umbrella	2,214,300	Auto Lamps	2,214,447
Heater Lamp	2,213,304	Anti-skid	2,214,303
Bubble Blower	2,213,391	Mirror	2,214,694
Ski Sail	2,213,754	Weaner	2,212,160
		Steering	2,214,163

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GLIDER PILOTS—

Aces of The Future!

Germany built up its deadly air force on the foundation of gliding instruction. In this article, America's greatest authority on motorless flying tells us how we can beat the Germans at their own game!

The author of this article, shown in his sailplane, aims a camera gun to snap pictures of an opposing sailplane in an aerial dogfight—using camera and film for bullets!

by William Hawley Bowlus

FLIGHT without power—gliding, sailplaning, soaring—is by all odds the fastest and least costly way of creating a vast and deadly army of military pilots. Five million eaglets from eighteen to twenty-two, an age group prime for exacting aerial service, stand ready to answer their country's call!

This is a staggering number. Only a fraction of those physically fit and intellectually capable would give America an air force surpassing in quality and quantity attacking squadrons of any possible combination of enemies. Within two or three years, youths skilled in construction, weather forecasting, navigation, and piloting would exceed by many times the 50,000 combat aircraft requested of Congress by President Roosevelt to make the nation "absolutely safe" against invasion by land, sea and air.

You may not think of the glider as a tool of war, yet from years of experience, I look upon this machine as the ideal training medium. Poland had 66 glider schools in operation at government expense when German legions poured across her borders. England and France for years have en-

How's the wind today? One embryo sailplane pilot checks the breeze with an anemometer, while two others study a map.

ABOUT THE AUTHOR

Undoubtedly the Number One gliding and soaring authority in the United States, William Hawley Bowlus has built over 300 sailplanes and has taught an undetermined number of people the fine art of riding the skies on motorless wings.

Among those to whom Bowlus has given instruction in soaring are Richard DuPont, both Colonel and Mrs. Charles A. Lindbergh, and Douglas "Wrong Way" Corrigan.

President of the Bowlus Sailplane Company, now located at San Fernando, California, Bowlus is as enthusiastic about soaring today as he was the first day he ever tried it!

couraged glider flying. Russia's glider pilots are many—fully 600,000—and men first trained in motorless planes loosed the bombs which blasted Finland to her knees.

When war broke over Europe, Germany had, I am sure, at least 450,000 capable fliers, including several thousand girls, available for combat duty or advanced through glider instruction to the point where only a few weeks in powered craft would make them ready for blitzkrieg service at the front . . . and beyond. Germany has 20 pilots for every one of her military planes, ready or soon to be ready.

"Give us 10,000 experienced glider pilots, and we can build a hundred squadrons of fighting pilots in a few weeks," said an air corps general recently. We have today about 1,000 young men experienced in glider piloting. The National Youth Administration not long ago purchased one machine with which to train youngsters at Cassidy Lake, New York. One glider, when thousands should be hopping thermals for ascents into the sky where we will find safety, or perhaps disaster. Gliders do not yet enter the plans of our naval and military air commanders.

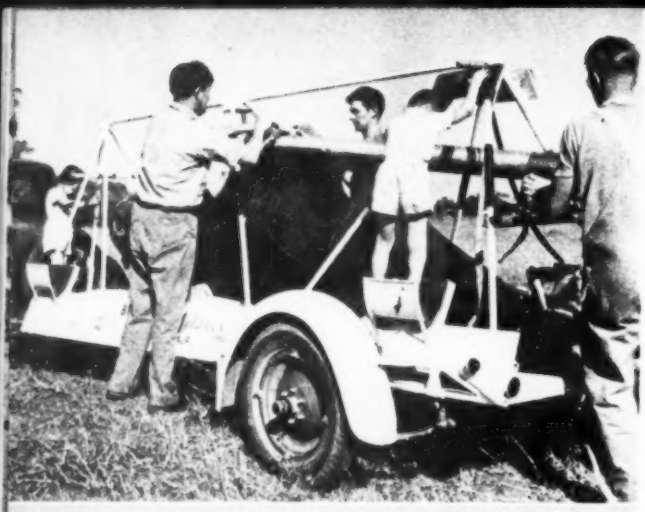
Some months ago Dr. John W. Studebaker, U. S. Commissioner of Education, reported that of 12,000 high schools and colleges surveyed, the unbelievably small number of 130 high schools and 109 colleges were offering courses in aviation. In these institutions, 25,000 boys and girls are members of aviation clubs. Their principal activities consist in

Here's a line-up of contestants' ships in a recent California sailplane meet. All over the country, this sport is growing.

Above: Spectators watch three soarers over hills at Arvin, California, one of the six sites proposed by the author for Civilian Gliding Corps schools. Right: So many gliders fill the air at sectional meets that take-offs are controlled by signal lights, such as the one shown here.

making scale-model, rubber-powered-model and gas-model planes. Only 200 schools actually have aircraft engines for study, and believe it or not, fewer than 100 own airplanes around which to offer instruction in construction and flight. But here's the payoff: 109 colleges offer 500 aviation courses, yet only 19 give flight training at a time when we need an aviation reserve so very desperately!

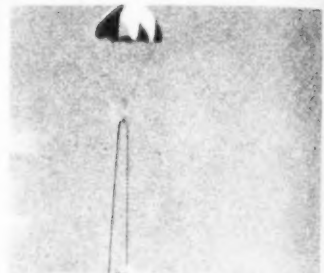
I think I have a sound answer to the problem, one which can be placed in operation at relatively little cost . . . little as compared to hundreds of millions pouring into armament and other preparedness programs . . .



William Hawley Bowlus, the author, is aided by his two small sons as he unloads the fuselage of his sailplane from a trailer at the field.

Two men can easily carry one wing of the sailplane. Unlike an airplane, the sailplane can be taken apart and stowed in a small space.

Bowlus, at left, and an assistant prepare a sailplane for flight. To the left of the picture can be seen its special trailer.

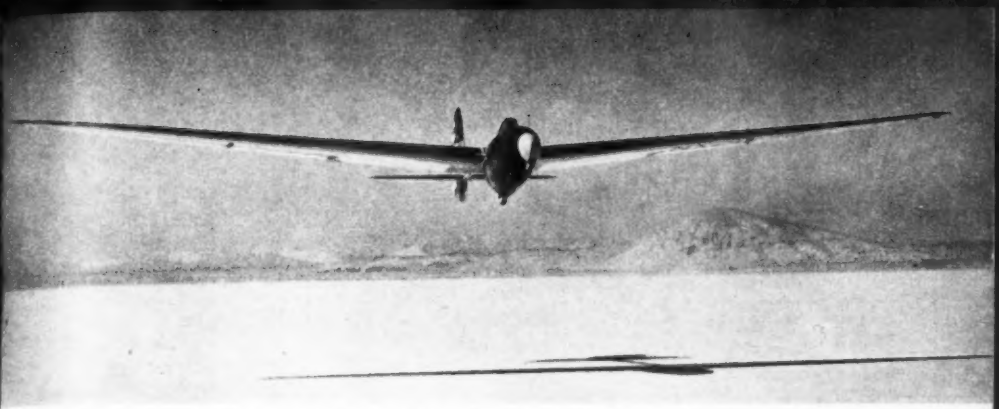


To facilitate speedy recovery for the next flight, a sailplane's tow rope floats to earth below a tiny parachute after the take-off.

and have thousands training before spring. Further, each year an increasing crop of pilots would reach the ready line, their wings already sprouted and needing only finishing combat touches to send them away on any mission for which the brass hats call.

I am sufficiently confident in my plan to dare think I could convince our Chief Executive in one hour that here we have the beginning of a qualified reserve no nation in the world could match.

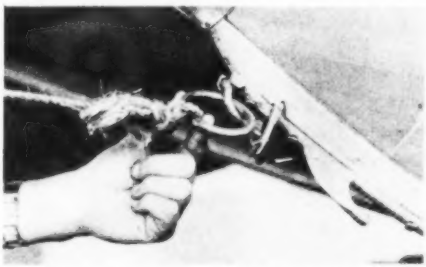
"Mr. President," I would say, abbreviating this account for sake of emphasis, "motorless flight embraces all forms of construction and design offered by other branches of aviation except the engine. (Not one in a thousand today, working in aviation, knows what makes the engine tick.) Military discipline,



Soaring down to a perfect landing on Rosamond dry lake, in Southern California, the author brings his $900 super-soarer to earth. This is one of the most expensive sailplanes now built, weighing 160 pounds, and having a wingspread of 42 feet.

meteorology, piloting, design, communications . . . yes, even dogfighting and bombing . . . these things may be taught with gliders."

From here I would drive home several essential points. "Our boys are ready to start flying in their early teens," I would tell the President. "Let them commence with class instruction at twelve, and I'll guarantee to solo them in gliders at fourteen. And, Mr. President, I'm interested in the average boy, not the relatively few who win college degrees and engineering jobs with the big airlines and factories. My idea, Mr. President, is that the great mass of young people are as interested in aviation as those whose incomes permit them to fly their own planes. These are the youngsters who will make our great air force. All they need is opportunity."



This closeup shows the details of the release mechanism for the tow rope, operated from the cockpit of the sailplane.

Should the President hear me out, I'd develop quickly this theme:

1. Permit youngsters in the elementary grades of all public schools to study the elements of flight, giving them model gliders to play with. Tearing down and rebuilding models whets their interest in theoretical studies.

2. Junk the obsolete airplanes collected by a few high schools, for those war-time Jennies and OX-5s bear little relation to the 400-mile-an-hour pursuits rolling off the lines today, and let the boys build full-scale gliders and fly them, under supervision of qualified instructors. Develop classes in simple engineering. Who knows but that from the thousands of youngsters trying new ideas, two or three revolutionary developments of incalculable value may be developed and become the U. S. War Department's exclusive property.

3. Here's the piece de resistance. During the first two years of high school, thousands of boys will demonstrate their mental and physical fitness for higher training. For them, let's establish a system of Junior West Points of the Air, perhaps enlisting the more promising in a Civilian Gliding Corps patterned after the Civilian Conservation Corps, or the R.O.T.C. Hand the program over to the Air Corps for direction, for the program avowedly will train military fliers.

Six schools would suffice as a starter, others to come later. Only two fundamental requirements need be met: find locations where satisfactory soaring conditions prevail, and make them reasonably available to population centers. We could spot one at Elmira, New York, where the famous national glider meet is held each year. Hangars, a towing winch for launching, swimming pools for recreation . . . the necessary facilities are already available there. Establish another at Dayton, Ohio, heart of all the Air Corps experimental laboratories. A third near Minneapolis; fourth at Tacoma, Washington, to serve the great

[*Continued on page* 138]

"Stairstep" For Plane Door

THE United States Army's twin engined fighter, the Bell Airacuda, boasts of a new convenience for its crew. The door slides up and down on tracks. In the lower position it acts as a ladder to facilitate entrance and exit. When the door is raised to the closed position the step slots also close. It is known as the "Stairstep"

Sand For Fallen Arches

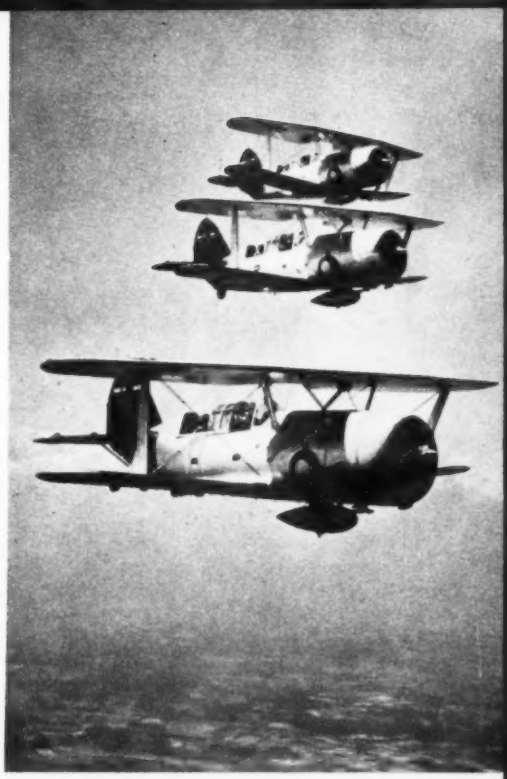
DR. THOMAS R. THORBURN of New York, recently stated that walking in sand would relieve fallen arches, arthritis, and rheumatism of the feet. He's showing Gertrude Bruehl how to use the bedroom sandbox that he advocated at the New Jersey Osteopathic convention. Judging by the pleasant smiles, the treatment is effective.

Flip Your Foot To Tune The Radio

AS AN added convenience for the motoring radio fans, this push button tuning switch enables the driver to tune the program he wants without taking either hand from the wheel. Operating like the well known light dimmer switch, it is pressed with the foot the desired number of times to tune the station desired. A solenoid in the set does the work.

Dive Bombers Can Take It!

THESE Curtiss SBC-4 dive bombers, also shown on the cover, can withstand the terrific strain of a "13½ G" dive. Their 1,000 horsepower engines enable them to climb rapidly despite the tremendous weight of deadly high explosive bombs. The streamlined fuel tanks beneath the fuselages are replaced by bombs in wartime.



Billion Candlepower Secret

MAJOR GEORGE GODDARD and Lieutenant Marcus Cooper are shown here preparing to test the Army's billion-candlepower secret photographic bomb. In twelve tests, 5,000 feet over Rochester, N. Y., the gigantic flash turned night into day in a five-mile area. Synchronized aerial cameras snapped the dazzling landscape on each test.

Mercury Lamp Rivals The Sun

THE man with the dark glasses at the right is setting fire to a piece of paper with the light of a lamp. The lamp is ⅛ as bright as the surface of the sun, and is of the mercury vapor type. The demonstrator shown exposing himself to the 10,000 watt glare is Mr. S. G. Hibben, director of applied lighting at the Westinghouse laboratories in Bloomfield, N. J. A glass water jacket surrounds the entire lamp for cooling.

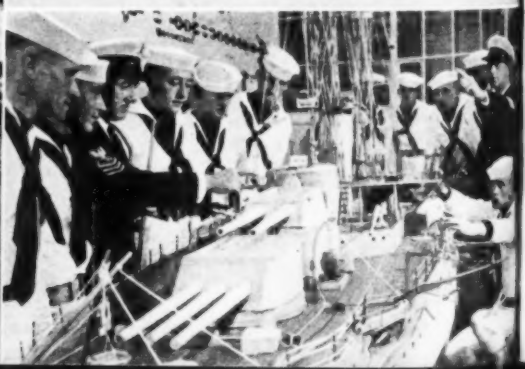
The landlubber does not usually associate the sailor with a rifle, but naval recruits must learn to shoot straight. Here is a class on the rifle range at the U. S. Naval Training Station at Newport, R. I. The men behind the riflemen are scorekeepers.

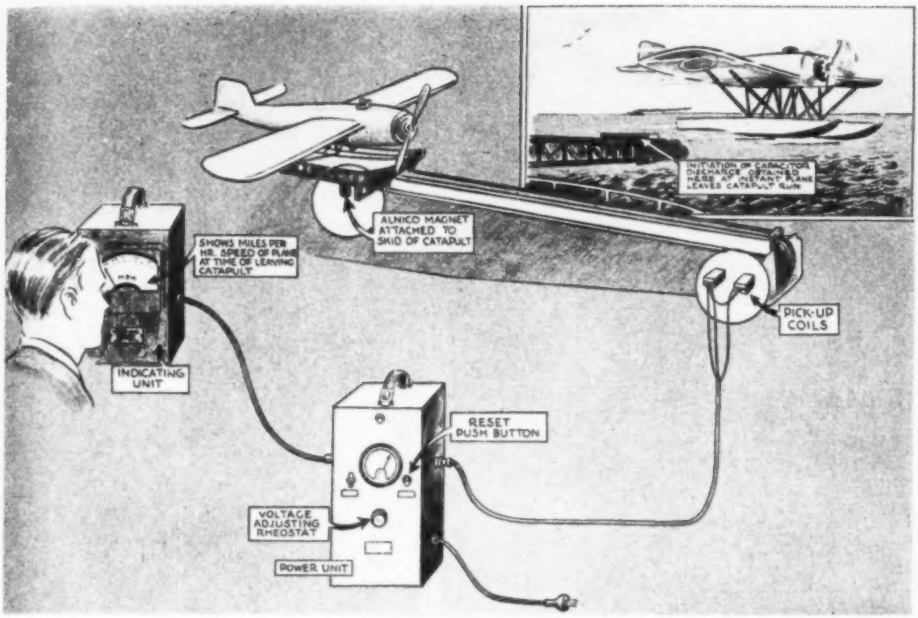
Sailors Go To Kindergarten!

WHEN you join the Navy to see the world, you don't begin your sightseeing tour right away. First you must become a sailor. Strange to relate, the metamorphosis that transforms the civilian into a sailor takes place on dry land. The United States Naval Training Station at Newport, R. I., is one of the four such institutions maintained by the Navy for turning civilians into sailors. The others are at Norfolk, Va.,

[*Continued on page* 141]

Sailors must "know the ropes," even if there are no sailing ships in the modern navy. The group at the left learns about square-riggers from studying a model. Below: The mysteries of the modern battleship are revealed to these recruits through study of this large scale model of the *U. S. S. Utah*.




INITIATION OF CAPACITOR DISCHARGE OCCURS AT INSTANT PLANE LEAVES CATAPULT RUN
ALNICO MAGNET ATTACHED TO SKID OF CATAPULT
SHOWS MILES PER HR. SPEED OF PLANE AT TIME OF LEAVING CATAPULT
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PICK-UP COILS
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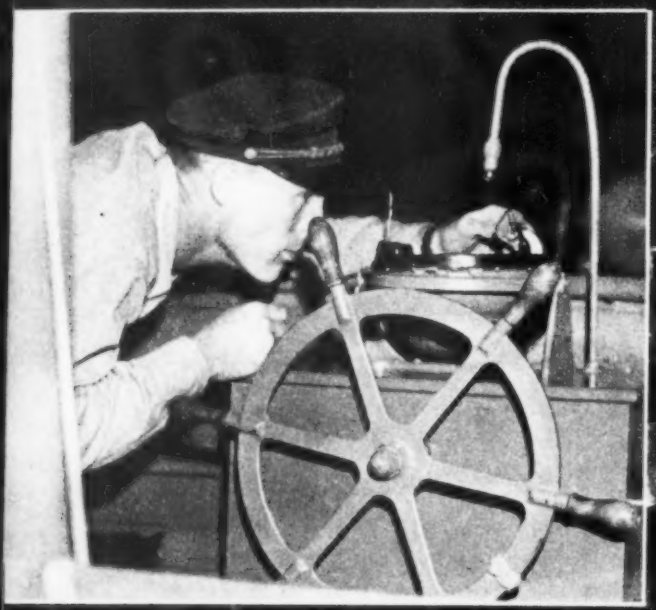
Speed Indicator For Plane Catapults

DESIGNED to prevent accidents during catapult takeoff operations, this electric speed indicator has been developed by H. P. Kuehni, of the General Electric Company. Current is generated by the passage of an alnico magnet over two pick-up coils at the end of the catapult track.

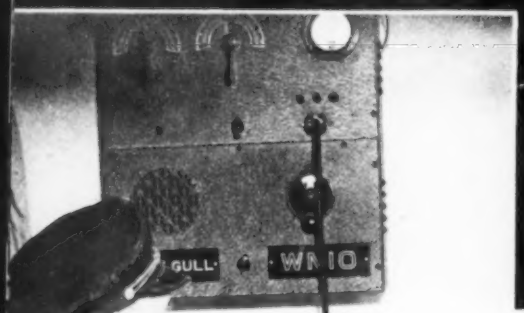
Stone Doll Houses Form Model Town

THE finishing touches are being put on the stone doll house above by its builder, Mr. Burton Brown. Now 72 years of age, Mr. Brown maintains his skill as a stone mason by building additions to the model village he has created at his home in Beaumont, California. The tiny houses are complete in every detail.

Fighting The TUNA P



Above: "Drawing a bead" on a pirate craft at night in order to take her position for court prosecution. The compass has hairline and illuminated scale. Below: Short-wave radio helps the *Gray Gull* track down the tuna pirates.



by Sterling Gleason

IT'S midnight. Across the glassy waters of Catalina Channel, offshore Los Angeles, dark craft are creeping, their navigation lights masked, their diesel engines throttled to a quiet purr. They are tuna pirates, the gangsters of the fishing grounds—a hard-bitten crew whose activities signal the beginning of a strange, nocturnal manhunt across the dark waters along the California coast.

A Pirates!

The closed waters off the California coast are where the gangsters of the deep and the Los Angeles patrol boat play a grim, nocturnal game of hide-and-seek, with a fortune in fish as the prize!

A member of the *Gray Gull's* crew is shown here plotting bearings on a navigation chart to see if a purse seiner is operating in closed waters off the California coast.

It is the dark of the moon and only an occasional slight sound betrays the presence of the fleet gliding in from all directions to converge on a milky, glowing patch of sea, a phosphorescence stirred to life by feverish activity in the depths below. A big school of tuna have come into the still, deep waters between Catalina Island and the mainland, to rest and feed upon rich submarine growths. Somehow the fish seem to know that here the law protects them and net fishing is taboo. But the black fleet is ready to take a big chance for the sake of rich treasure. They're after fat tuna, a yard long, fifteen to thirty pounds in weight, and worth a dollar and a half apiece; plump, spotted mackerel; myriads of silver sardines so plentiful the water fairly boils—and when a single haul of the net may bring up 100 tons of fish, a successful raid means a young fortune for the crew.

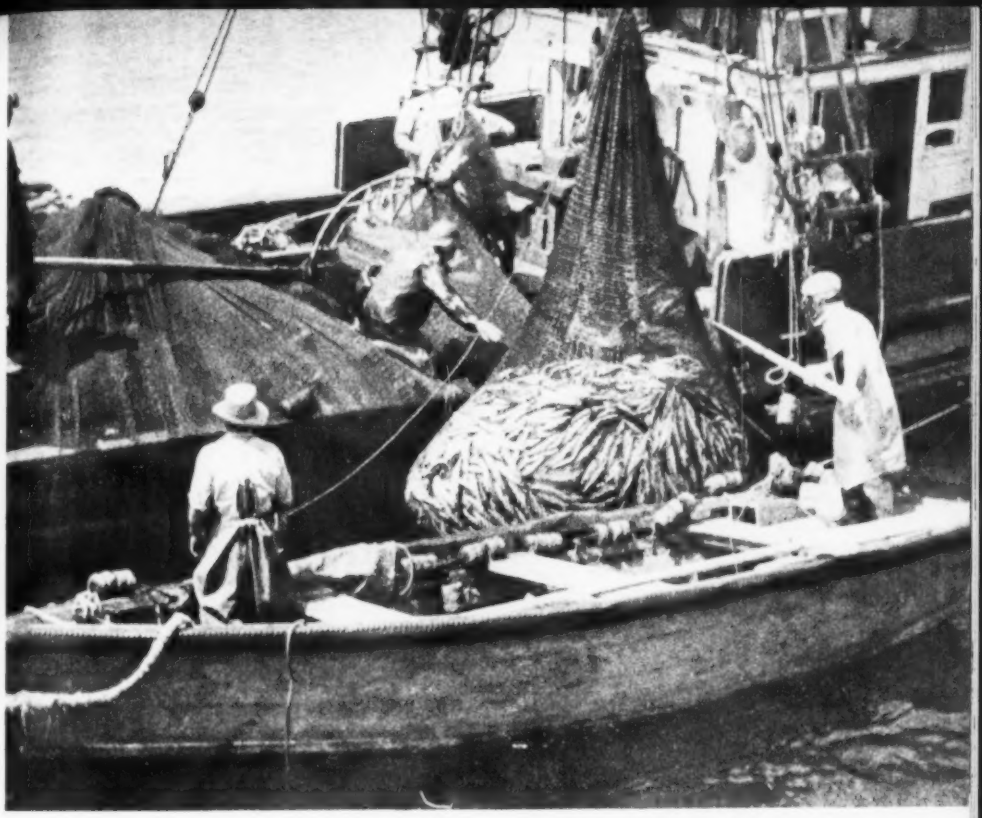
Closing up the "purse." Seiners draw the mile long net up into a bag filled with a teeming mass of wriggling tuna, spotted mackerel, and silver sardines. One of these huge nets is worth as much as $5,000.

From the stern of each boat, men pay out a net from a huge pile stacked cabin-high on the deck. Far behind in a skiff, the net-tender holds the end of the giant seine. Meanwhile the mother ship traces a wide circle that brings her back alongside the skiff—closing the net into a huge circle nearly a mile in circumference.

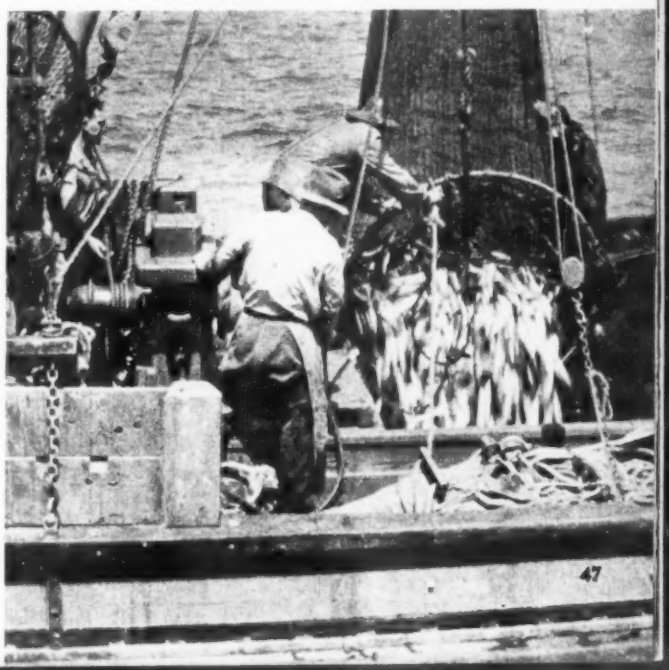
Now they attach the end of the line to a winch aboard the seiner. Engines chug, the capstan grudgingly revolves, pulling in the heavy line like the drawstring of a giant purse. Smaller and smaller shrinks the net, becoming a bag sagging with a teaming mass of wriggling, flapping fish. As it is dragged alongside, men swing the brail—a six-foot dip net attached to a power-operated boom—and scoop up load after load into the hold, until at last it overflows onto the deck and the men stand knee-deep in silvery treasure.

"Stand by! You are under arrest for fishing in closed waters with a net!" One of the *Gray Gull's* crew gives the command that means trouble for the tuna pirates.

But two can play at this game of wits. Constantly patroling the protected waters is the Los Angeles County Forestry Department's *Gray Gull*, a trim cruiser whose 175-horsepower engines send her clipping along at a good stiff pace. And if the pirates are adept in tracking schools of tuna, so are the officers—and at tracking pirates as well. They know when the fish are running, and when the price is right. They know every secluded cove that offers tempting shelter to raiders—and night after night they play a cat-and-mouse game along the twenty-seven mile channel between



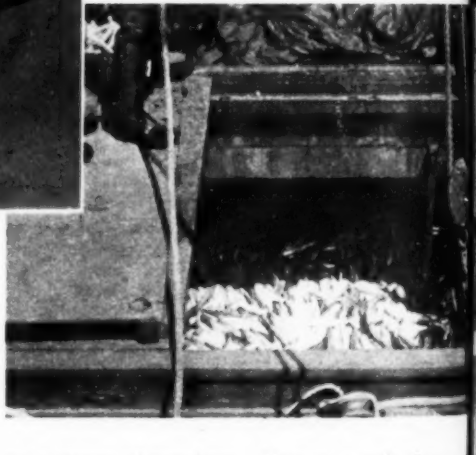
Above: The "brail," or dip net, brings up the fish from the huge purse seine. Below: Emptying the brail, which is operated by a power-driven boom, into the hold of one of the fishing boats. A good haul can mean a small fortune for the pirates if they evade capture.



Catalina and the mainland.

In these semi-tropical waters it's hard to move without leaving a trace, for phosphorescence makes a skiff's oars cut gleaming figures as a doryman plies them, and a ship's wake stands out behind her like a ribbon of fire. But the *Gray Gull* also must move slowly, lest her movements be detected by a lookout in the crow's nest. Her engines, gasoline driven, beat a light tattoo quite different from the heavy purr of a fisherman's diesels, and when she stalks the pirate fleet she must creep ever so gently or risk flushing her quarry too soon.

Best time for the pirates is a night when heavy fog lies upon the Channel and you can't see a boat-length ahead. Then the *Gray Gull* noses cautiously out into the murk in the almost certain knowl-



Above: The *Gray Gull*, the patrol boat which brings great unhappiness into the life of a tuna pirate. Left: Tear gas guns are used if necessary to subdue prisoners who put up a fight. Below: A hold full of fish such as this warms a tuna pirate's heart. It does, that is, until the *Gray Gull* comes along!

edge that poachers will be aboard. Through her cabin windows her skipper peers into the white mist, ready to throw the engines into quick reverse should a pirate craft, running without lights, loom up in her path.

Down aft, Engineer E. K. Adkins has his ear close to the loudspeaker of the ship's short-wave radio receiver, for these poachers like to spread the news of a big school among their friends. Listening in the vicinity of 2738 kilocycles, Adkins may overhear:

"Hello, Tony, this is Pedro. What's your position—and are you finding any?"

"We're off the west end—plenty of tuna feeding here, keeping us pretty busy just now."

And before the conversation is finished, the *Gray Gull* is skimming off to the rendezvous.

But tonight is clear, and although it is the dark of the moon, only by the utmost caution has the *Gray Gull* succeeded in creeping up on a group of poachers. Now at a safe distance she silently waits. Over the water float telltale sounds—the creak of tackle, the swish of nets striking the water and unfolding in a seiner's wake; the splash of oars, the rattle of chains, the dull grumble of engines as the heavy load is drawn in and the giant pouch closed; and finally, the downward swoop of the brail and its slow, dripping ascent.

Now the moment has come. The *Gray Gull's* engines roar at full throttle. Ahead she darts, her bow digging deep into the

[*Continued on page* 135]

The First Pretzel Bender

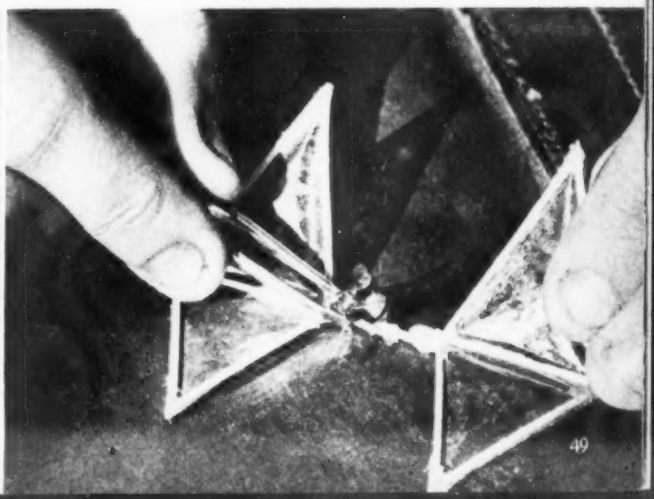
HARRY A. ELLIOTT, of Jefferson, Iowa, has invented an aid for elbow benders. It's the world's first pretzel bender, shown below. Starting with nothing but a dough stick, the machine performs 100 movements of pretzel manipulations on each pretzel. It took Mr. Elliott 5 months to evolve the device which can make 400 pretzels a minute.

"Average Man" Is Brainless

NO WONDER this important figure in the automotive industry shows so little interest in the girl beside him. He has no brains. , He's "Johnny," the Ford Motor Company's average sized cardboard man. With a height of 5′ 8″, he sits 35¾ inches high. Car designers use him to make certain that new models will have comfortable seats.

Plane Seems To Bee Really A "Honey"

A MODEL plane enthusiast of San Antonio, California, is holding a honey bee carefully with a pair of tweezers as he attaches it to the new bee-powered model airplane. An unusually quick-drying cement is used so as not to cause discomfort to the insect. As the little plane is extremely light, the bee can power it with the greatest of ease.



WIN THIS
FREE!

THINK of it!—A $1,500 Taylorcraft Trainer, and nearly a hundred other valuable prizes—and they're all *free* to the readers of MECHANIX ILLUSTRATED!

JUST take a peek at some of the prizes listed on the opposite page. Why, it's the opportunity of a lifetime—and that's not all! These are just a few of the things you can win in the big MECHANIX ILLUSTRATED prize contest, which starts in the February issue. There'll be boats, guns, lathes, camera supplies, shop tools, radios, model kits, electric razors—EVERYTHING!

DON'T miss the big February issue of MECHANIX ILLUSTRATED—and, above all, be prepared for this amazing contest. There has never been another one like it in the mechanics magazine field. And, best of all, *anyone* can win one of these prizes. It will be so simple it will astound you!

SO RESERVE your copy of the February issue NOW! *Tomorrow may be too late*—for this will be the greatest issue of MECHANIX ILLUSTRATED ever published!!

S PLANE!

Here is a list of just a few of the many prizes to be awarded ABSOLUTELY FREE in the MECHANIX ILLUSTRATED prize contest:

Taylorcraft Plane
Wilson Sporting Goods-Don Budge Tennis Racquet
J. B. Williams Roto-Shaver
S. L. Allen-Flexible Flyer Skis
Foldex Camera Tripod
Hein-Warner Hydraulic Jack
Utica Duxbak Hunting Coat
Kirsten Pipe
Kirsten Cigarette Holder
Foredom De Luxe Workshop Tool Set
Iver Johnson Target Pistol
Boyce-Meier Sextant
Axel Rainsuiter (oilskin suit for sports)
Kaywoodie Pipe (for outdoors)
Skilsaw "Zephyrplane" Junior Sander
Motorola Bicycle Radio
Remington Electric Razor
A. C. Gilbert Locomotive & Tender Kit
Solar Enlarger
G-M Standard Exposure Meter
Hull Automobile Compass
Hull Outdoor Compass
Mossberg Targo Skeet Shooting Outfit
Pflueger Supreme Fishing Reel
MCM Photometer
Brownie Junior Model Motor
Moto Tool Kit
Moto Saw
GHQ Model Gas Engines (five of them!)
K-D Adverse Weather (Fog) Lamp
Atlas Lathe
Briggs & Stratton Boat Engine
Hallicrafters All-Wave Marine Radio
Polaroid Day Glasses
Ranger Model Evinrude Outboard Motor
Stanley Tool Chest
Bausch & Lomb Microscope
Comet Sailplane Kit
Kalart Flash Gun (two of them!)
DeJur-Amsco Exposure Meter
Mead Glider Ki-Yak
Fisher Junior Model Radio Direction Finder
Federal Enlarger
Allied Radio Receiver
Ronson Table Lighter
Sheaffer Pen & Pencil Ensemble
Weed Tire Chains
DeLuxe Model Handee Workshop Tool
Marlin Shotgun
Midwest Radio Receiver

They've Loaded Their

by
John T. Lynch

No longer are trucks the ugly ducklings of the highway, thanks to four men with a bright idea and plenty of perseverance!

Above: Joe Morgagni, wearing glasses and facing the camera, goes over some plans with chief engineer Maurice Tures (seated) and designer W. Everett Miller.

Right: This is the armored car—with ladders—turned out in record time for the Twentieth Century-Fox Studios, in Hollywood.

JOE MORGAGNI walked into a cheap eatery—a one-arm joint for sure. He picked up a spoon from the greasy counter and studied it until the yellow-haired queen in the spotted apron snappily approached.

"Make up ya' mind, fella," she commanded. "Whatcha goin' ta' eat?"

"Oh, nothing to eat," Joe grinned. "But I'd like to buy this spoon—"

"C'mon, guy," crackled the lady. "No time for comedy!"

After a bit of diplomatic dickering Joe walked from the place with the spoon in his pocket. It was a plain spoon, made for utility purposes only. That's why Joe bought it from the astounded young shrew behind the hashery counter. When he dropped it into his pocket it clinked against another spoon in there. This one was a well made, artistically wrought piece of fine tableware.

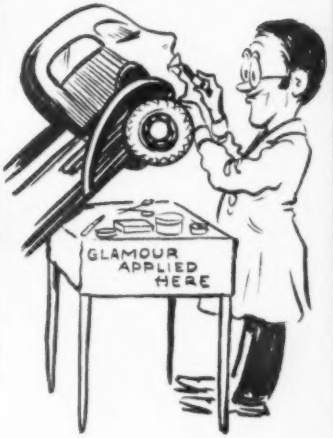
Joe made his way across town to the main office building of a large ice and cold storage company and asked to talk to the man who was going to buy the new custom built trucks for the firm.

Once in the purchasing agent's presence, Joe's first act was to place the two oh-so-different spoons side by side on the man's desk.

"What are you selling, spoons or autobodies?" asked the P. A.

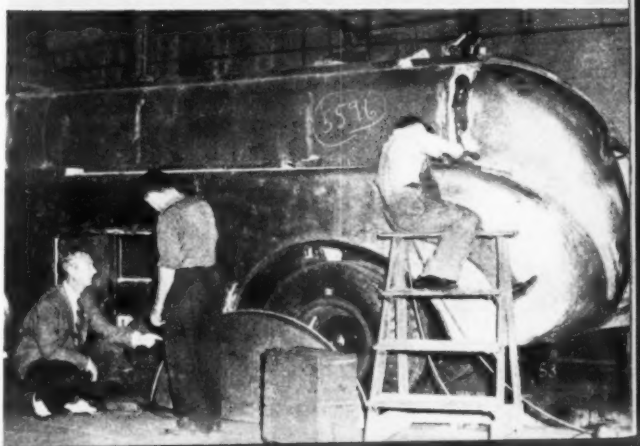
"Autobody building is my business," Joe

Trucks With Glamour!



Above is the first all metal tank truck built by Advance. Compare it with the sleek looking job below, which the company recently turned out for the Union Oil Company. That's Joe's brother, Julius Morgagni, at the left, talking things over with partner Louie Pontrelli.

Below: Tex Chambers, tank salesman supreme, talks over a new construction job with one of the partners, Louie Pontrelli.



smiled. "But take a good look at those spoons. They tell a story. The plain spoon serves its purpose—but that's all. The classy spoon serves the same purpose, but it pleases the eye, too. They hardly differ in price."

If this scene hadn't taken place back in 1924 the P. A. might have said, "So what?" at this point. But it wasn't, and he didn't. He sighed wearily and permitted Joe to go on.

"The spoons," Joe went on, "are like trucks. You see, up until now commercial trucks have been built

One of Advance's Coca-Cola trucks, which can transport a greater payload than any other truck of the same size.

only for utility. A tank truck is just a greasy, leaking tank on wheels. An ice truck is just a big, square box on wheels. Now, why not take the example of the spoons—and make your new trucks so beautiful that they will be mobile advertisements instead of highway eyesores. Make 'em colorful. Traveling billboards! Get it?"

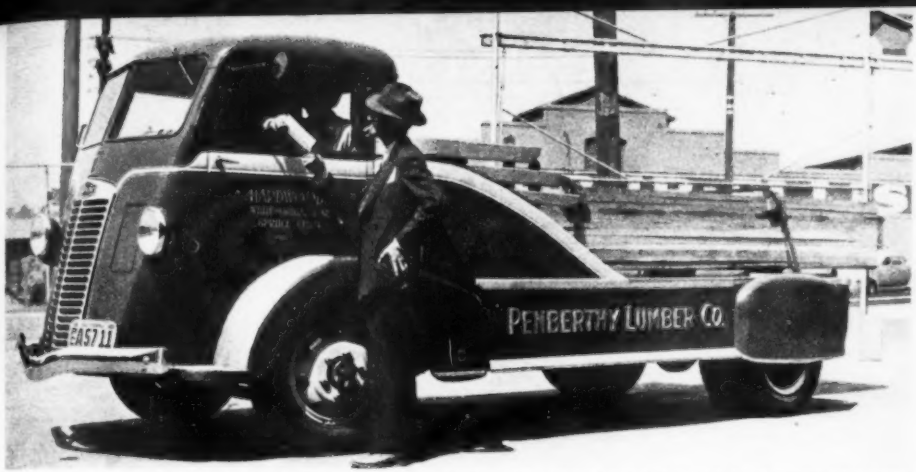
The purchasing agent did get it. The result was the first all-steel commercial autobody ever to hit the highways. It was the first truck in the nation in which beauty and usefulness were combined. It was the beginning of a revolution in the building of truck bodies. It was the first "mobile billboard"—as the autobody trade calls the great, colorful, shining, streamlined trucks now plying the highways in the course of hauling the nation's motor transported goods.

Time was when commercial vehicles were the ugly ducklings of traffic; the step-children of the streets. As passenger cars became more and more beautiful, and motor ways were planned with an increasing attention to appearance, trucks came to be looked upon as necessary, dirty evils. And they were. Paintless, crude and cumbersome, they were relegated to the back streets in many cities.

But it struck Joe Morgagni that trucks could be made in such a way as to actually add to the general beauty of the outdoor scene, instead of detracting from it.

Today's trucks prove how right he was. Mobile billboards are everywhere serving

Advance is mighty proud of this wine truck, made of genuine redwood and resembling in every detail an actual wine cask.



The high tensile steel body of this lumber truck is a bright blue. The trimming and sign work is of natural-color wood.

their useful purposes and, at the same time, doing their important part well in the laudable trend on the part of industry to make use of art.

Joe was the first commercial autobody builder to hire an industrial artist. "I saw what Bel Geddes and other such men were doing for other industries, even to the beautifying of pots and pans. It made me wonder what an industrial artist could do with duralumin, high-tensile steel, and color."

That is when he hired W. Everett Miller, famed industrial designer, and gave him free rein in his organization of body builders—The Advance Autobody Works of Los Angeles. Miller led off with creations for Coca-Cola; Safeway Stores; Twentieth Century-Fox; and other such original, exacting outfits. The ornate, individuality styled units of transportation now in use by such organizations are Miller's brain-children.

Joe Morgagni, whose magic wand of imagination changed the working world's mice-and-pumpkins into coaches-and-sixes, came to America as a lone immigrant boy of fifteen. He left his home in Italy after saving enough out of his meagre pay as a mechanic's helper to buy steerage passage to the promised land.

Although he could barely understand English his first few months in New York, he understood enough to hear what must have been a native son talk of California. Joe got a job in a laundry, ironing shirts, and hoarded

Here's a section of the Advance shop where the final touches are given trucks, making them highway beauties instead of eyesores.

Two of Advance's "mobile billboards." The side panel of the larger truck is a single piece of steel, and can be removed

a few cents a week until he had the fare to Los Angeles.

When he arrived on the coast he was penniless and hungry, again. Too, he realized that he misunderstood about those oranges and bananas you could pick when you got hungry. There was a laundry up the street from the station. Because of his New York experience Joe landed a shirt ironing job.

"At first," Joe recalls, "I had one medium-sized iron. I had to keep the gas jet under it turned low so it wouldn't get too hot. But, by the time I was ready to quit the laundry, six months later—when I got a job as a mechanic's helper—I was using two big-size irons, gas up full pressure, and was ironing eighty shirts a day."

Go ahead, *you* try to hand-iron eighty shirts in a day!

Just as Joe Morgagni became a full fledged mechanic, World War I broke its original bounds and America entered it. Joe enlisted. After his initial training at Fort Leavenworth he was sent overseas where he spent seventeen months in the signal corps. In France he met three other American soldiers of Italian birth whose homes, like Joe's, were in Los Angeles.

One of the boys, Louie Accomazzi, was a woodworker by trade. Another, Louie Pontrelli, was a blacksmith. The third was Joe's own brother, Julius. Julius had followed Joe to America, but couldn't find him. The meeting in France was sheer coincidence.

The four doughboys became inseparable. One rainy night, shortly after the Armistice was signed, the four sat around a fly-specked table in a little cafe near Paris. The same thing was in each mind. They would soon be home again. Would their jobs be open to them?

Then Joe got an idea. They would go into business for themselves! Their combined trades pointed to the building of special autobodies.

"First we need a name," Joe said. They all mulled it over.

"Look," said Pontrelli. "We're going into business for ourselves so we can advance in life, aren't we?"

So the Advance Autobody Works, the creations of which are zipping along the highways of the United States, was launched by four soon-to-be "ex" doughboys in a dingy bistro near Paris.

After being mustered out at the Presidio in San Francisco the quartet returned to their home town and pooled their resources. The total was three tool boxes (one without tools), and three hundred dollars in folding money. They rented a small garage, turned

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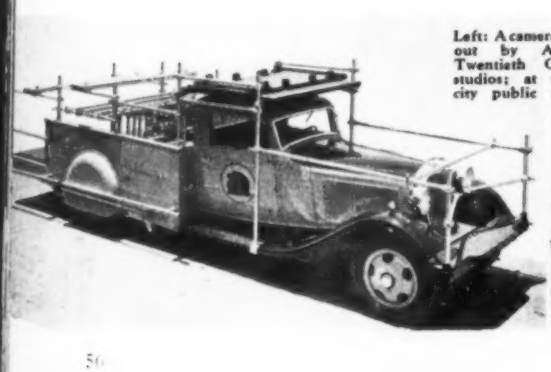
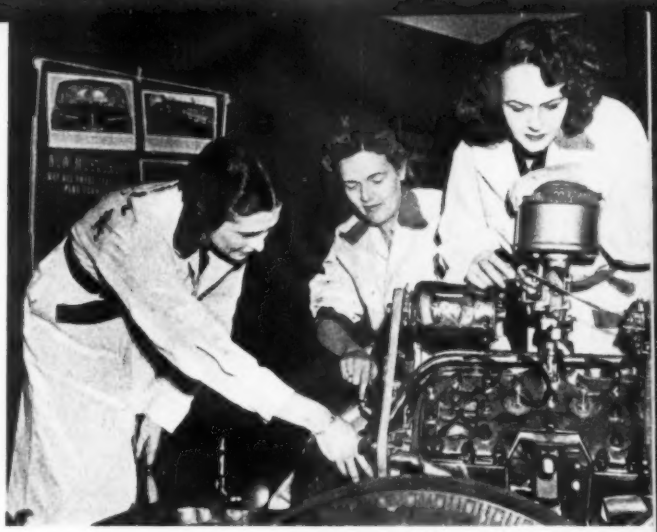


Left: A camera truck turned out by Advance for Twentieth Century-Fox studios; at the right, a city public utility truck.

And They Don't Use A Hairpin!

THE three women shown here are members of the American Women's Voluntary Services, of New York City, and they're taking an auto mechanics course to prepare for some of the jobs that women can do in time of national emergency. If the interest on their faces is any indication of their enthusiasm for the work, male motor mechanics have some competition in store for them. The motor is a special one for instruction purposes.



This Plane Takes A "Bellywhopper"

UPON discovery that its retractable landing gear was jammed, this United Air Lines plane was ordered back to Oakland, California, after taking off for Los Angeles. This picture shows it as it skidded into the Oakland airport on its "belly," under the direction of a pilot's skill. Eight passengers and the crew of three aboard the plane were unhurt. A photographer was on hand to snap this remarkable photo of the plane as it "pancaked" to a safe landing.

Fire Fighters Look Like Men From Mars

LOOKING like weird creatures from a fairy story, or another planet, these six white-clad men are members of the Fleet Air Arm, of Great Britain. The suits are of asbestos, their purpose being to aid in rescuing airmen who may be trapped in a burning aircraft. They can also be used in helping to combat any fire on board aircraft carriers or on warships which carry aircraft. These suits look to us like perfect outfits for camouflage in winter warfare.

Left: "Doc" Hinkley sizes a young lady's thumb, using a case of varied cubes for the job.

Success Rolled Down His Alley!

MANY inventors have had hard struggles to get started, but few have practically had to break their necks. Yet that, in a word, is how "Doc" Hinkley, bowling grip expert whose miraculous bowling balls do to kegling scores what the jack-rabbit baseball did to batting averages, got his start.

It all began this way. Doc is quite a bowler in his own right, but he never could find a ball that just exactly suited him. Checking up, he found that there are only thirty-five potential grips on standard balls. There should, he thought, be an unlimited number, since probably no two of the tens of thousands bowlers have exactly identical hands.

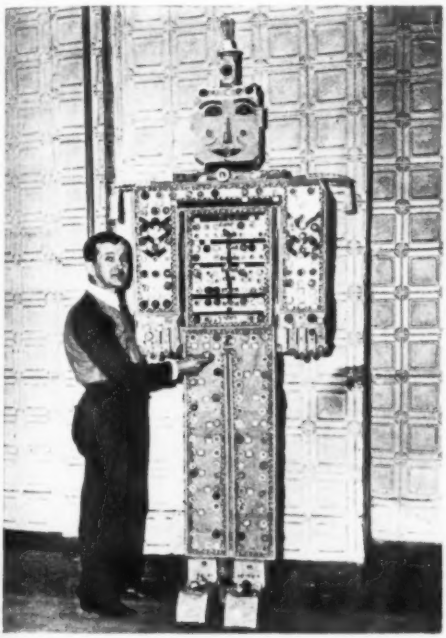
For several years, in a way characteristic of inventors, Doc mulled over plans for such a grip gauge, but nothing came of them until one day his feet slid on slick, treacherous tile beside a swimming pool, and to the hospital he went. The doctors told him he

[*Continued on page* 141]

Left: Hinkley is shown drilling out a thumb hole after the proper fitting has been made. Above: A close-up of the bowling grip gauge invented by Hinkley.

Pigeons Like Machine Age!

MAYOR TOM TAGGERT of Atlantic City, N. J., is shown at the right demonstrating a new grain vending machine recently installed on the famous Boardwalk. The machine, which was invented by Sylvester Dorey, of Gloversville, N. Y., gives forth a supply of grain when either a penny or a nickel is inserted.

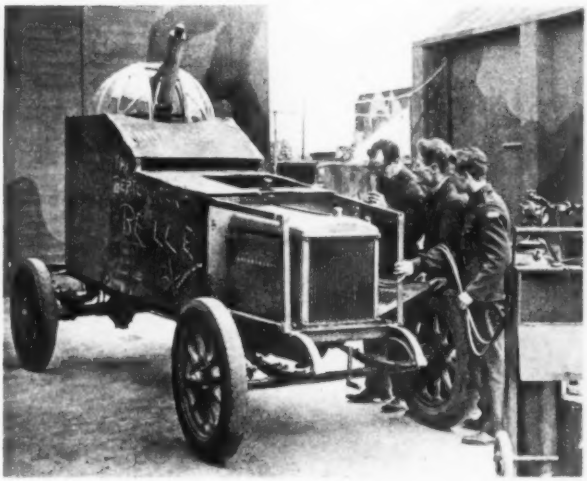


Fuses Are His Hobby

WE'VE heard of stamp, coin and match box collectors, but George E. Hawkins, of Brooklyn, N. Y., is the first person we've come across who collects electric fuses. He is shown at the left with his collection, which is mounted on "Fusey," a really shocking sort of a chap, whose life's ambition is to be a member of the Royal Fusileers.

And They Call Her "Annie Lorrie"

THE photo at the right shows "Annie Lorrie," the product of spare time handiwork by members of the ground and maintenance staff of a unit of the British Air Transport Auxiliary. Built on the chassis of an old Morris car, armored "Annie" boasts parts from several German planes which have been shot down. Her builders stoutly maintain that "Annie" can give a good account of herself.



There's an ART to

Combining an artist's imagination with a keen inventive talent, the amazing Mr. Hawxhurst lets nothing phase him when it comes to producing something new and different!

by John G. Copeland

Try this on your spine! Henry Hawxhurst invented this rather terrifying looking stretcher to correct and straighten curved and weak spines.

WHETHER Henry Ivins Hawxhurst is an artist whose hobby is invention, or an inventor who has turned to art for relaxation, is as fruitless a question as that historic conundrum concerning the chicken and the egg.

More to the point, this 60-year-old Southern California artist is a sort of modern Leonardo da Vinci, to whom art and invention have assumed their original interrelationship. His extraordinary studio-workshop stands as concrete proof that inventive genius and artistic creativeness are fundamentally one and the same thing!

So, for a thumbnail biography of the man, and a picture of his Old Barn studios and shop, in Sierra Madre, California. His personal story includes a career on the vaudeville stage with Al Jolson, a career as a political cartoonist on practically every big metropolitan paper in San Francisco and Los Angeles, a career as a landscape and portrait painter of repute—but more importantly for the purpose of this article, a career as an inventor, which has paralleled each of the other activities, commencing over 30 years ago, and still going strong.

Sketching in the background of Harry Hawxhurst's inventive life, before visiting his present day workshop, we might as well mention such whimsical devices as the wind turbine, the sun motor—and their successor, the robot scarecrow that keeps comic mechanical watch over the

Being an Inventor!

Directly above, Hawxhurst is shown in his machine shop, working at the metal lathe. At the right, the artist-inventor looks over his foot-controlled easel, powered by a discarded sewing machine motor and controlled with old washing machine gears.

chemical culture gardens in the studio yard.

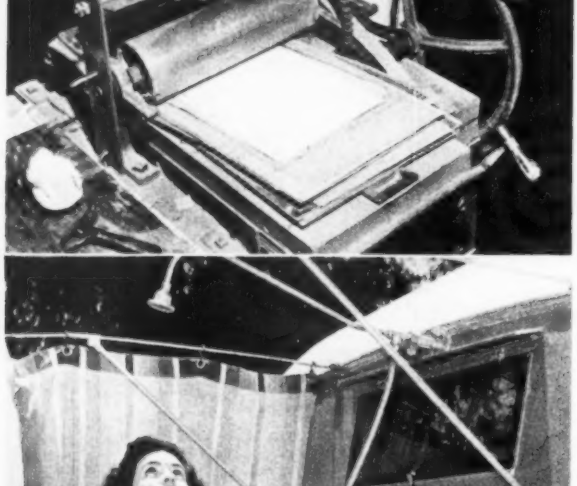
Back in 1910 when Hawxhurst was cartooning he became intrigued with the windmill experiments being conducted on the gale swept bluffs of Golden Gate Park, San Francisco, and in consequence went to work and devised a wind turbine which for all its whimsy was judged to be the most efficient wind propelled mechanism in existence.

Today all that remains of what once promised to be a million dollar enterprise for harnessing the never ceasing ocean winds, is the first crude model, and a few snapshots of the test mills. The turbine rotated vertically, the air currents striking a series of delicately hinged fins that opened and shut proportionately to the wind velocity, presenting a maximum of blade surface when the wind was low, a minimum when high. The tendency of the standard Dutch mill's horizontal rotation to tear the whole thing to pieces by centrifugal force limited power possibilities; the wind turbine had no such limitations.

By applying the power directly on the main vertical drive shaft, which rested on button bearings resembling in principle the jewel balance of a watch, the torsion effected by worm gears at the top of a Dutch mill shaft was eliminated. Multiple "sails" were arranged in banks on the larger turbines.

As for the sun motor, the artist describes that creation with his tongue in cheek. Briefly, it consisted of a 45-foot lever of the first class, with a piston on one end, and a large, hollow bulb on the end farthest from the fulcrum. The lever consisted of a tube, connecting the ball with the piston; natural sun heat expanded water in the spherical reservoir, forcing it down the tube into the piston, all of which thrust the extremely off-balance see-saw into reverse. The bulb then rested in a shade box, where the water contracted and returned to its original displace-

Hawxhurst operates his home made etching press, made from parts of old washing machines, and a motorcycle.



ment. Voila! Perpetual motion on sunny days!

Which brings us at last into the Hawxhurst yard, where we are greeted by a plaster of Paris Mephisto, who glares when the bamboo gate is opened. At the same time a hidden switch lights the garden, an electric relay is set in motion opening the front door, and inside a chimes sounds your arrival.

A jangle and flash of reflected light calls immediate attention to the scarecrow. It proves to be a 15-foot length of bamboo, bedecked with bird scaring mirrors and bells, which is thrown violently out of balance by a can full of stones. At the opposite end of the pole, a scoop shaped can receives a tiny flow of water (fed through copper tubing that once saw service in carburetion experiments described later). When the water overbalances the stones, the scarecrow goes into action, the water is dumped, and the hydraulic counterweight again starts to build up. The timing is regulated by the rate of flow, and the water goes economically into irrigation.

The studio-home is lighted in a subdued key, some of the lamps being nothing more or less than painted jars, set in copper holders that have been hand cut and hammered by the artist. Others are plaster half domes, with inset marbles giving forth a faint, rainbow glow, and the entire effect is Bohemian and harmonious.

Out in the kitchen the sink is sheathed in hammered, antiqued copper, and numerous ornamental utensils, ash trays, and incidental grill work, are made of identical material.

The copper is symbolic, its highly artistic use appearing in strange contrast to its original function. For the copper comes from a ceiling high stack of vacuum tanks that mingle with a confusion of gadgets, precision

At the left is shown the outdoor shower which the versatile artist built for his trailer, which serves him as a mobile art studio.

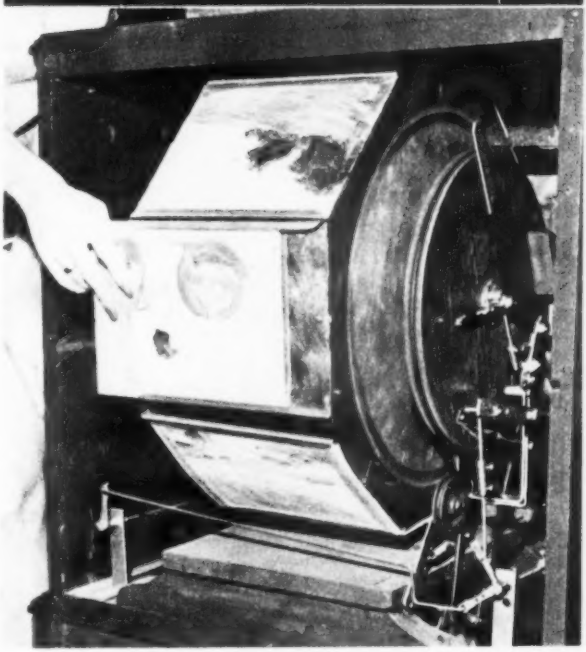
tools, and corner cobwebs out in the "shop." The tanks are remnants of an auxiliary carburetor that Hawxhurst invented some 30 years ago. He was one of the nation's many unsung pioneers in the automotive line.

In a trade bulletin the artist saw a notice advising car salesmen to make their demonstrations in the early morning or during damp weather. So the logical development seemed to be some sort of device for mixing water with the gasoline mixture; this he proceeded to do by merely spraying water vapor into the manifold. All of which sounds simple and "old-fashioned" today, but was then revolutionary.

Other carburetor inventions on which Hawxhurst secured basic patents included a celluloid float, providing automatic, barometric and thermostatic mixture control, due to expansion and contraction of the float. Too, there was the metering valve which eliminated needle valve wear by providing similar function through staggered placement of tiny jets on the valve, rotated in and out of the vacuum.

The etching press, through which have come thousands of Hawxhurst's own etchings, started out in life as a common old wooden washing machine. The large "ship wheel" and the smaller gear connecting to the etching roller, were both from the washer, and the operating handles are off just plain files. The core of the roller is a heavy copper motorcycle presto tank in disguise—clad in 4-inch water pipe machined to size. All of the odd parts manage to stand up under more than a ton pressure. The 3½ to 1 gear ratio afforded is a departure from the standard gearless type of press that has been widely used ever since Rembrandt and before, giving a much

Above is a front view of the portable miniature gallery for exhibiting small oil painting, showing the curtains and set frame. Below is a rear view of the "gallery," showing the octagonal drum on which the pictures turn, and some of the operating mechanism.



Left: Hawxhurst's manually operated car signal, shown here in its first crude form, with a cast lead counterweight and completely home made parts. Directly above is a studio lantern made of an old fruit jar and hammered brass.

easier and smoother touch but retaining the "feel" that gives an etching the sought for quality.

Incidentally, the back gearing wheel that once was a companion piece in the washing machine, now does duty in a foot-controlled easel—powered by a castoff sewing machine motor!

Overhead, above the model's throne, is a powerful work lamp, with carefully designed filters that allow the artist to continue a painting at night with no sacrifice of color values. The precise blue tint necessary for the filter was found by breaking down the spectrum through a simple prism, charting the color values of both sunlight and electric globe rays—then making up the deficiencies with proper screens.

On the throne sits what at first glance appears to be a radio cabinet, decorated with curtains. It's Harry Hawxhurst's answer to mass reproduction of color prints, and the like—a portable miniature art gallery intended to stimulate interest in small, inexpensive—but actual—oil paintings. He believes his fellow artists must "streamline" their efforts to compete with the camera and giant presses. Novelty is his personal solution.

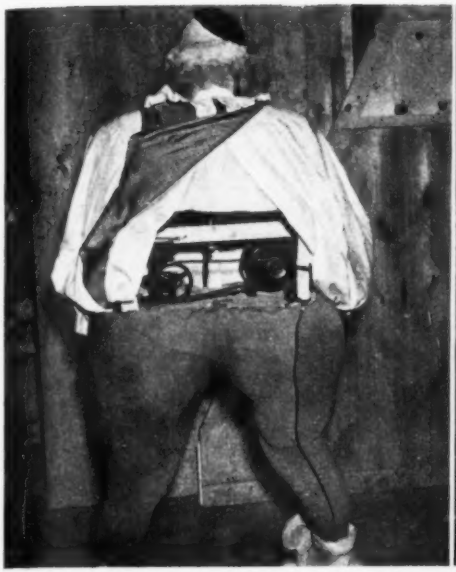
In the back of the cabinet is a revolving hexagonal magazine on which are clipped eight 6″x9″ oil paintings. Each picture is shown separately for a predetermined time, and as the drum revolves to place new paintings back of the set frame the curtains methodically open and close to veil the rotation and reveal the canvases.

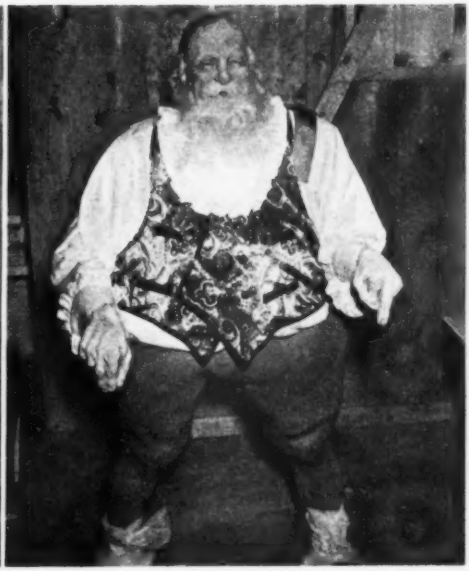
Synchronization was the No. 1 problem, and one of the countless difficulties overcome was the elimination by acoustical padding of the vibratory hum amplified in the metal drum. As every single part had to be hand manufactured, or radically converted, the Little Gallery represents an investment of about a year's work.

In the same field, Hawxhurst introduced the leather brush technique of painting. Leather instead of bristles, he finds, produces a palette knife effect, but is more flexible. Also, we might mention that, in a minor capacity of poet he is suspicious of editorial word assay—so he has equipped his typewriter with a wordometer (formerly as bicycle speedometer) moved by the spacer.

At this stage of the studio inspection, Mr. Hawxhurst is liable to arise and stretch. "Wouldn't you like to try my patented exerciser?" he might politely inquire. This would lead to the startling discovery that he also has delved into the subject of mechanical therapy, and perfected two devices at least that have been widely accepted by medical institutes and reputable surgeons.

[*Continued on page* 150]





Santa Comes To See St. Louis

IGNORING world conditions, Santa Claus has returned from the polar regions for his annual visit. These photographs were taken in a St. Louis, Mo., department store. His extremely natural appearance is enhanced by the motions of his limbs and face. The mechanism shown in the upper left hand picture is responsible for the movements.

Gook And Dum-dum Stop The Noises

THIS gentleman is a "sound detective" at work in a car on the Ford test grounds at Dearborn, Michigan. With the aid of a sound level meter the annoying vibrations are eliminated from the car. Materials nicknamed "gook" and "dum-dum" are used to damp vibrant panels.

Special Truck Hauls Big Bombs

THESE two gentlemen are loading a one-ton aerial bomb on to a special truck for transportation at March Field, California. The bomb, one of Uncle Sam's newest, is on its way to a giant bomber. Notice the two holes in the lifting bracket which enable the men handling the bombs to lift the various types at the center of gravity, or balance point. The difference in weight distribution in the different types of bombs calls for careful handling.

Noah's Ark Modern Style

THIS up-to-date version of Noah's Ark in trailer form is shown cruising on Lake Geneva in Switzerland. The comely feminine Noahs not only have the company of their pet bird and dog, but also avoid crowding by towing the pets behind. The tiny raft is supported by an inflated tube as well as by its own buoyancy. The "ark" proper is designed on cantamaran lines with the rudder on one pontoon.

Colonel Tickle Builds A Bonnet

LADY DIANA DUFF COOPER is shown inspecting the invention of Britain's Colonel Tickle. The purpose of the invention is the protection of vital points of a standard automobile from bullets and bomb fragments. During tests, the protective armor deflected bullets that would have shattered the windshield, radiator and hood or "bonnet." The device will aid in converting standard pleasure cars to military use.

You're RIGHT—That's WRONG!

Here are 25 statements, some of them true, the others false. The trick is to separate the *true* statements from the *false* ones—and it isn't as easy as it looks! Use a pen or pencil and check the correct box under each statement and see how you make out! After you've given yourself the test, try it out on friends and other members of the family and compare scores. They'll enjoy it and so will you.

Are you ready? Let's go!

1. The plastic windows used in many modern military airplanes are not bulletproof.
   True ☐ False ☐

2. A curling stone is a long, thin piece of rock with which primitive African pygmy women [illegible] hair.
   True ☐ False ☐

3. An act of Congress prohibits the use of the terms "port" and "starboard" in orders to helmsmen aboard ship.
   True ☐ False ☐

4. A catamaran is a fierce tropical wildcat, noted for its fearless attacks on larger animals.
   True ☐ False ☐

5. An escapement is a part of the mechanism of a clock or watch.
   True ☐ False ☐

6. Spirit gum is a narcotic chewing gum that causes visions of ghosts in the mind of the user.
   True ☐ False ☐

7. Modern cars equipped with the new "fluid coupling" have gears also.
   True ☐ False ☐

8. Teredos are light weight torpedoes designed for use with military aircraft assigned to naval operations.
   True ☐ False ☐

9. Nostalgia is a nasal ailment that can be recognized by the difficulty in breathing which accompanies it.
   True ☐ False ☐

10. Fishermen use an anemometer to determine the number of anemones present in any given area of sea bottom.
    True ☐ False ☐

11. Although the brake bands of early automobiles gripped the outside of the drum, those of most modern cars grip the inside.
    True ☐ False ☐

12. Grizzly bears, the most ferocious of American bears, are not good to eat.
    True ☐ False ☐

13. The term "bow-iron" as applied to a boat hull, indicates a pig iron bow.
    True ☐ False ☐

14. A bulldozer is a machine for pressing and bending pieces of metal.
    True ☐ False ☐

15. Diesel engines are always more powerful than any other type of power plants.
    True ☐ False ☐

16. In 1870, during the Franco-Prussian war, mail was carried from Paris by air for distances up to 600 miles.
    True ☐ False ☐

17. The object of mixing oil with the gasoline of an outboard motor is the prevention of rust in the carburetor.
    True ☐ False ☐

18. Without a differential, it would be impossible to shift gears in an automobile.
    True ☐ False ☐

19. Howitzers are shorter and lighter than guns used to fire projectiles of the same size.
    True ☐ False ☐

20. In electric welding, the heat must always be supplied by an acetylene torch.
    True ☐ False ☐

21. A telephoto lens is one especially designed to take pictures of photographs sent by telephone.
    True ☐ False ☐

22. The female seal snatches up its eggs with its gills whenever its nest is attacked.
    True ☐ False ☐

23. Babbitt bearings are not as hard as steel, and can be scratched with an ordinary penknife.
    True ☐ False ☐

24. A supercharger is usually geared to turn faster than the crankshaft of the engine on which it is mounted.
    True ☐ False ☐

25. A taximeter is a device that automatically calculates the fare in a taxicab.
    True ☐ False ☐

WHAT'S YOUR SCORE?

To get your score, simply give yourself 4 points for every question you answer correctly and total the result. If your mark is above 90, you are exceptional; if it is between 80 and 90, you deserve high praise; if it's between 70 and 80, you're good; between 60 and 70, fair; and below 60—well, try again next month!

Answers will be found on page 151

INDIAN GOLF

Above: Walt Wilhelm watches as his brother Ken "holes out" in a game of Indian golf. Above, right: Four fair enthusiasts of the new game "tee off."

Here's Ken Wilhelm retrieving an arrow from the front catwalk of the brothers' desert cruiser.

FOLKS, get yourself a bow and a quiver of arrows and join in a game of Indian golf, a new national pastime now sweeping the nation.

The idea of Indian, or archery, golf was born out on the Mojave Desert where the Wilhelm brothers hunt for wild cats and coyotes with bow and arrow. It occurred to the more imaginative Walt Wilhelm to do his shooting on the links of the Furnace Creek Inn golf course. He learned that more sport could be had at archery golf, especially when a group of shooters get together and decide the rules on the spur of the moment. The toughest shots are the most interesting.

When the bow and arrow pinch-hits for the driver, midiron and putter, the player uses three arrows; one of them is a streamlined affair, very light and fletched with small feathers. This is known as the flight arrow, and it is used to tee off with, as greater distance can be gotten with it. Then comes the approach arrow; it has large feathers and a long point so it will stick in the ground and stay there. The third is the putting arrow, a heavy affair with a blunt point, made to fly accurately and used as the putter.

Unlike orthodox golf, any number of players can participate in one round of archery golf. For the first shot, the player aims high in the air for an arrow goes farthest

Hits The Bull's-Eye!

when it is shot at a forty-five degree angle. If there's a little wind, the higher the arrow is shot, the greater the drift. The flight arrows will travel anywhere up to 325 yards, which is about the same distance that a crack pro golfer would get off the tee, although Death Valley's Ken Wilhelm made a 509-yard shot with his foot bow on the Furnace Creek Inn golf course.

Each player starts his second shot from the point where his flight arrow lies or sticks in the sod. Using the approach arrow, he tries to land on the green, where he changes to his heavy blunt arrow to putt with.

Here's how the archers "hole out." Different systems are used. Some of the clubs use a small cardboard disk, set in the ground about three feet from the flag. Others use sacks of sand. The most popular, an invention of Ben Pearson of Pine Bluff, Arkansas, is a cotton ball, four inches in diameter, placed on top of the metal rod 28 inches in height, which is stuck in the ground. To "hole out," a player has to knock the cotton

[*Continued on page* 153]

Walt and Ken Wilhelm are sizing up their "putts" after "holding out" in three on the 450-yard thirteenth.

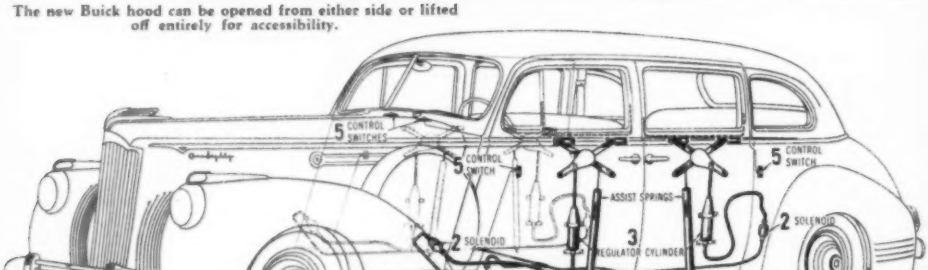
Directly above and at the right are shown two different ways of "teeing off" in the game of Indian golf. The Wilhelm brothers are shown getting off their first arrows from the deck of their cruiser, above, and from the ground, at the right.

Under The Hood

American coachwork conceals mechanical marvels never before available on standard cars anywhere in the world. American engineering opens new vistas in automotive progress—on some new cars, in fact, it even opens the windows.

by F. C. Russell

The new Buick hood can be opened from either side or lifted off entirely for accessibility.



Packard's automatic windows. Note control button in circle.

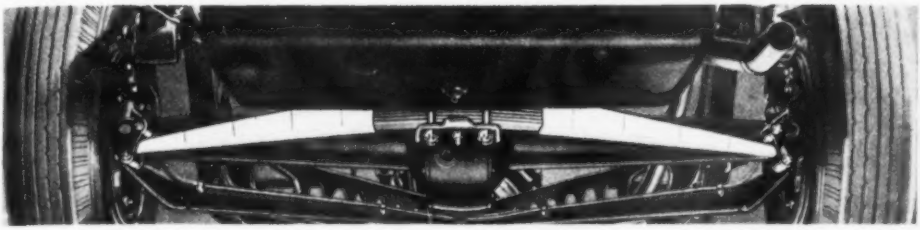
SO THE automobile has become standardized? Wait a minute! Hold everything, including that amazing concentration of control—the accelerator! The 1940's may have hinted at slowing down, but the 1941's upset all predictions. Once again the automobile industry is pioneering with innovations. Once again you can sit around the family table and discuss something more than style and color when a new car is the topic of conversation.

I have just had the unusual experience of flipping a switch on the instrument panel to make one of the front windows drop down. Another flip and it was up again. Yesterday's dream, now a reality on Packard 180 and the Lincoln Custom.

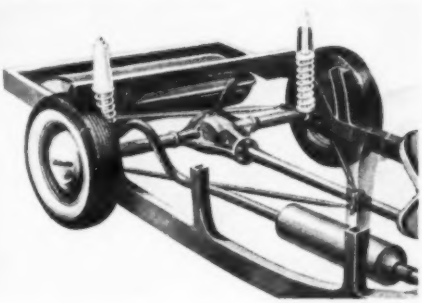
How?

Just this: a reversible electric motor under the front seat operates a hydraulic pump. In each door there is a hydraulic cylinder which actuates the window mechanism, cylinders being solenoid controlled with a system of

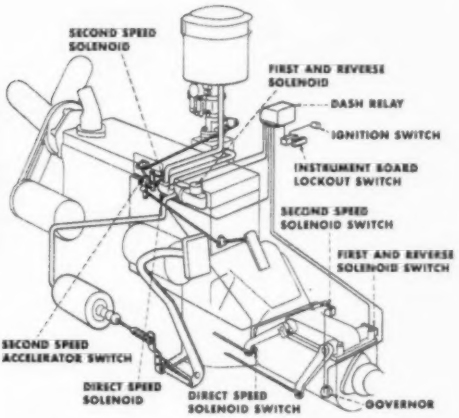
Of The 1941 Cars



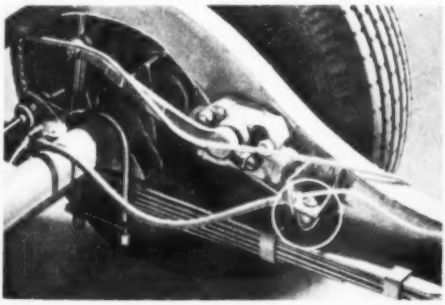
Ford angle shackles increase the effective spring length.



Nash Ambassador "600" has shock absorbers inside springs.



Packard Electromatic Clutch stops "traffic fatigue."

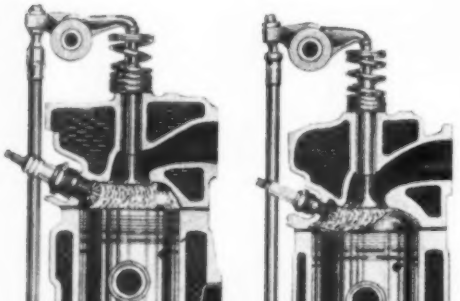


How "bottoming" jolts are eliminated by Cadillac springs.

electrical interlocks which prevent passengers from trying to raise or lower the windows simultaneously.

Something that comes closer to home because it touches the pocketbook is the new Chevrolet ignition scheme whereby the life of breaker points is greatly extended because each time the starter operates polarity of the ignition system reverses. Effect of this is to equalize deposition of metal from one breaker point to the other. This plan competes in novelty with the Pontiac innovation of pro-

General Motors' sliding sun-shields kill all glare.

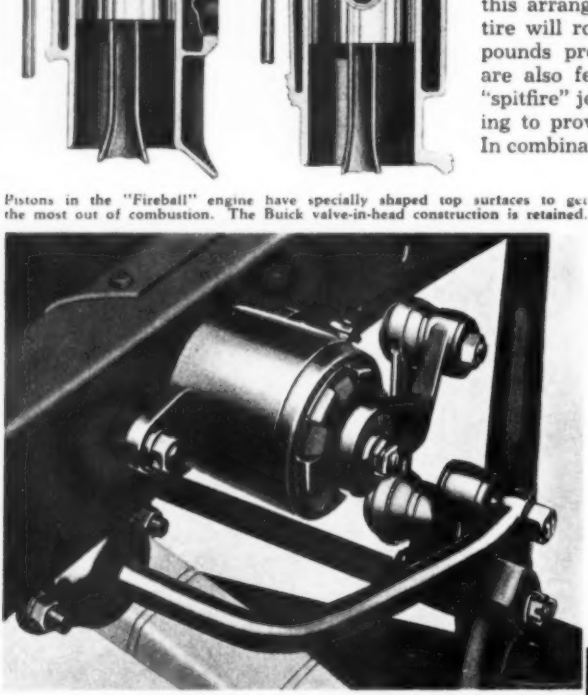


Pistons in the "Fireball" engine have specially shaped top surfaces to get the most out of combustion. The Buick valve-in-head construction is retained.

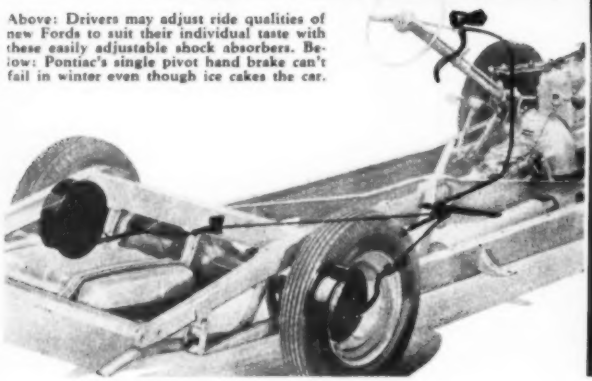
viding 100 per cent oil filtration by making the filter a part of the oiling system right inside the crankcase. When oil is being drawn into the pump it must do a flip-flop through a series of baffles and traps. In reversing its flow the oil gives up its accumulation of sediment, dirt being caught in the trap. The idea is based on an early type of air cleaner.

By using a wider rim and one that gets a firmer grip on the tire bead Chrysler engineers have devised a safety feature for Dodge, De Soto, Plymouth and Chrysler that looks like the end of worrying over blowouts. With this arrangement a blown out or punctured tire will roll as safely as one reduced to 10 pounds pressure. Chrysler cars themselves are also featuring what their sponsors call "spitfire" jets. These extra jets stand in waiting to provide reserve power when needed. In combination with fluid drive and kickdown overdrive some entirely new effects in driving are possible. Combining various individual features provides a new innovation.

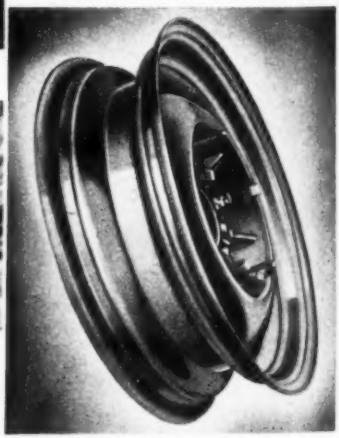
Buick presents an unusual type of dual carburetion. Instead of using the two twin-venturi carburetors to increase the power of the engine throughout the entire speed range, Buick employs them both separately and in combination. When idling, the engine is fed by both carburetors. As the throttle is opened, the rear carburetor ceases to operate, permitting single-car-



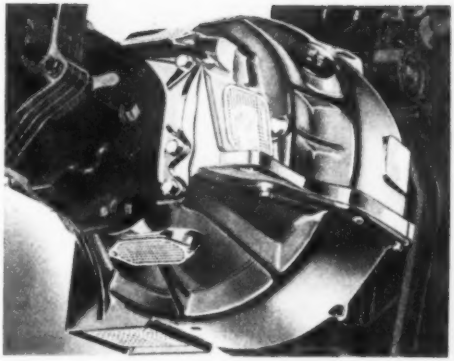
Above: Drivers may adjust ride qualities of new Fords to suit their individual taste with these easily adjustable shock absorbers. Below: Pontiac's single pivot hand brake can't fail in winter even though ice cakes the car.



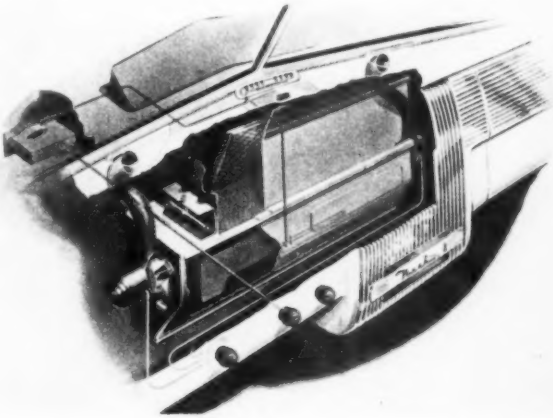
Below: This Chrysler safety rim won't let a blown out tire fly off the car's wheel.



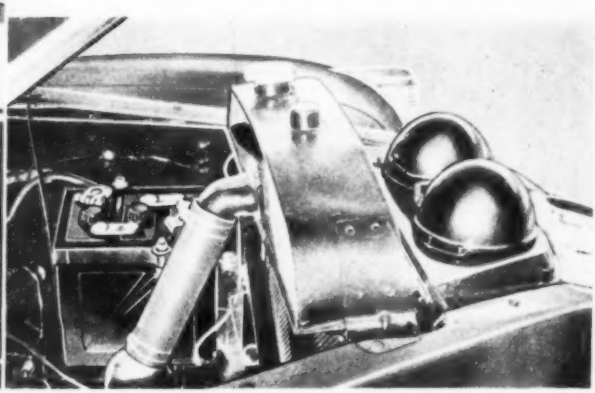
buretor operation to effect greater fuel economy. By opening the throttle wider (to about 70 m. p. h. on a level road) a mechanism connected in the throttle control mechanically opens the rear carburetor throttle valve. In the event that the accelerator pedal is depressed suddenly or under conditions of extreme load (as on a steep hill) a vacuum operated damper valve between the mechanical throttle valve and the manifold, remains closed to prevent the second carburetor from functioning unnecessarily. In other words, the extra carburetor only goes into action when the motor has already reached its peak performance on the other one. In the instance mentioned (a step hill) the second carburetor would come into action when the manifold vacuum opened the damper valve in addition to the throttle mechanism opening the throttle valve. When the additional power is no longer required, as would be the case after climbing the hill, or in reducing speed on a level run, the accelerator is raised slightly in normal fashion and the second carburetor no longer operates. By this method neither performance nor economy is sacrificed. Since air is drawn from a new type carburetor intake located behind the radiator grilles there is better distribution of air to both carburetors and the mixture benefits by

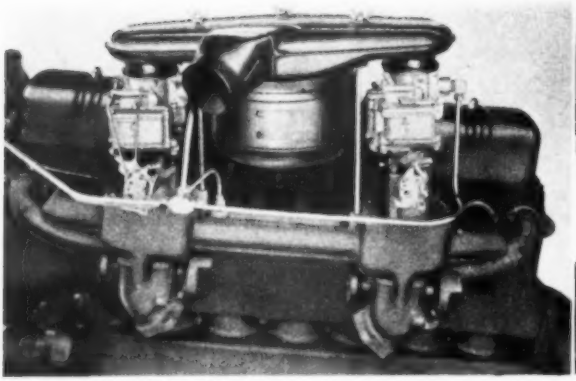


Above: Modern fluid coupling brings these screened ventilators to the coupling housing of the 1941 Chryslers.

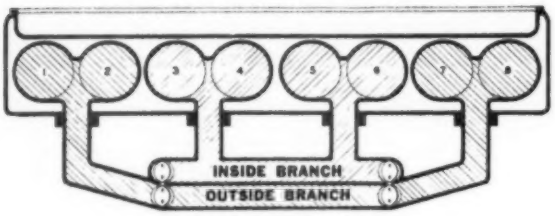


Above: Thermostatic control of the Nash "Weather-eye" keeps the interior of the car at a comfortable temperature automatically. Blowers also keep windshield clear. Below: New Plymouth horn position in grille. Left: Water jets inside block cool valve seats on the new Pontiac.

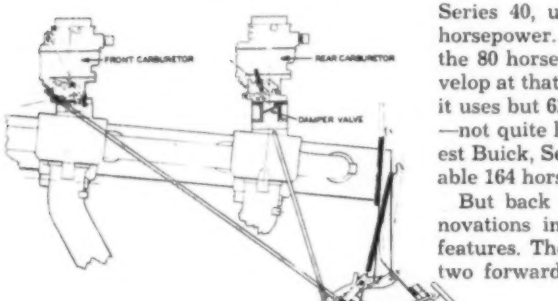




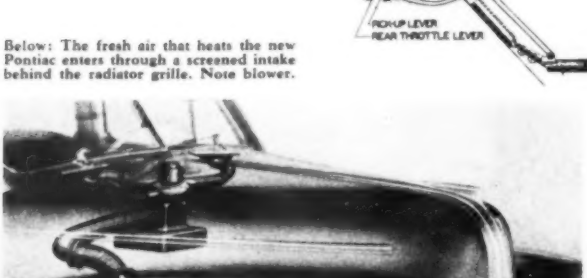
Upper right: Studebaker's starter is under the clutch pedal so driver must declutch to start. Upper left and below: Buick's new system of dual carburetion.



INLET DISTRIBUTION



Below: The fresh air that heats the new Pontiac enters through a screened intake behind the radiator grille. Note blower.

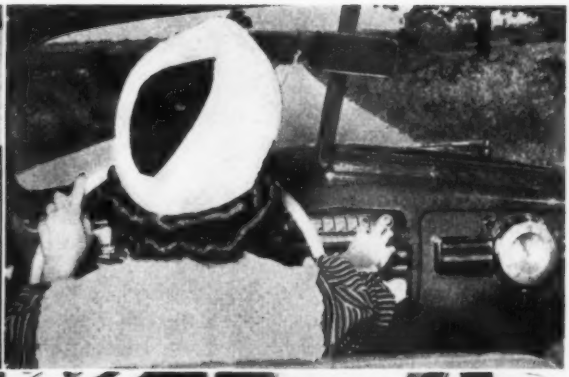


reason of lower temperature. This better fuel-air mixture ratio has made it possible to increase compression ratio by 0.5 to 1 without additional tendency to "ping" or detonate. But what is accomplished by way of performance is more interesting than this new system's action.

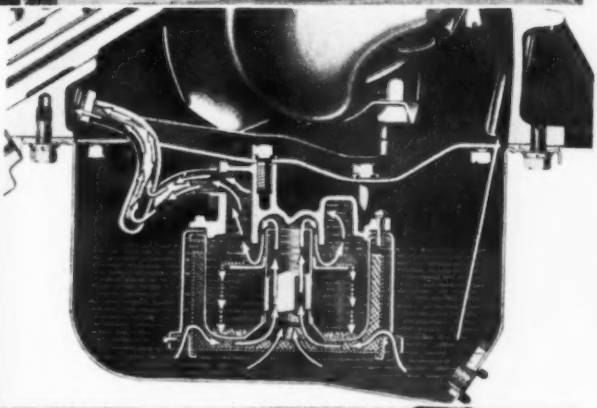
For instance, at 20 miles per hour the smallest of the Buicks, Series 40, uses only 3½ of its 39 available horsepower. At 40 m. p. h. it uses only 12 of the 80 horsepower which the engine can develop at that speed, while at 80 miles per hour it uses but 62 of the 125 horsepower available —not quite half. At this same speed the largest Buick, Series 90, uses only 78 of the available 164 horsepower!

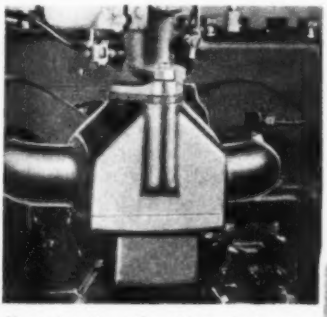
But back to De Soto for more of the innovations in results due to combining new features. The shift lever of this car has only two forward speed positions, yet the transmission is definitely of the four-forward-speeds type. Choice of two lows or two highs is made by action of the accelerator. For ordinary driving you shift to the high gear position with the transmission in the starting gear ratio of 5.49 to 1. At about 15 miles per hour the transmission can be automatically shifted to the 3.54 to 1 cruising ratio by momentarily lifting your foot from the accelerator.

To get back into the 5.49 ratio you push the accelerator all the way to the floor. Exactly the same procedure is used to select

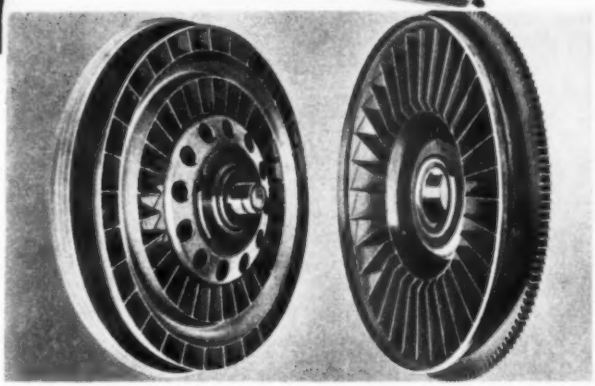


Upper right: Pontiac's radio tuning buttons are above speaker instead of below it, aiding safety. Upper left: Controls for Studebaker's new all-weather Climatizer.





Above: Americar offers this intake heater to boost fuel vaporization for economy. Carburetor can be seen on top of heater.



The two pictures directly above show Pontiac oil filter and fluid drive rotors.

either of the two low gears, the speed for automatic shifting to the second of the two lows being 8 miles per hour. No shift position corresponding to low gear is used. Chrysler's "Vacamatic Transmission" is similar to the De Soto arrangement.

Vacuum created by engine intake is used for shifting the gears into the higher ratios, dropping into the lower ratios being by means of the kickdown control. This "Simplimatic Transmission" on De Soto embodies what is known as "underdrive" and it permits the car to free wheel in first and third ratios. So that the engine can be started by pushing or towing the car a manual lockout is provided.

On Plymouth, Ford and Dodge a lower second gear is used in order to provide faster starting and getaway. Naturally where these more versatile transmissions are used with fluid drive, as on Chrysler, Dodge and De Soto there is opportunity to obtain unusually smooth performance over the entire driving range. Fluid drive cars can be started in high even when climbing hills, but in the lower

[*Continued on page* 142]

Fortune on the Floor!

The largest floor Mueller ever put down was this one for "jitterbugs" in the Los Angeles Coliseum.

BACK in 1934, an unemployed automobile salesman named H. B. Mueller was broke.

His brother's little girl was taking dancing lessons, and her gyrations were rapidly wearing out the living room rug. For want of something else to do, Mueller got a few pieces of tongue and groove material and made her a miniature floor to lay flat on the rug to save it.

The neighbor, whose little girl also danced, wanted one like it. Mueller obliged. The children put their panels side by side sometimes and danced together, but the crevice had a tendency to trip them. Mueller wondered if he could fix the panels so they could be joined or separated at will. He worked for quite a time on some system of eliminating any evidence of a joint before he hit on a bar and hook system. Bedded in one panel, he put a small, vertical bar. In the other, a horizontal revolving hook. By locking these, the panels were tightly drawn.

[*Continued on page* 150]

Above: Locking two sections of the floor together. Note how tightly the joints fit together. Right: Mueller's stair-climbing wheelbarrow coming down.

Here's Uncle Sam's Newest Scout Car

AS OUR defense program gets to rolling into high gear, dozens of different types of mechanized vehicles are rolling off assembly lines all over the nation. Here are two members of the U. S. Army testing their machine-gun sights from the back of one of the new scout cars being manufactured for the use of mechanized troops. The car, which has bulletproof tires, is equipped for varied duties. Note the ax on the side of the car.

Old Ships Make A Snug Harbor!

TOLD that it would cost $75,000 to dredge and build a breakwater for a boat harbor, a California man was struck with the idea of using old condemned ships for the job. The seven old ships were bought and placed for a total cost of $10,000—a saving of $65,000! Each ship was moored to a piling at each end and filled with water to sink it into the sand. The result was this interesting and picturesque harbor.

The Large and Small Of Army Transports

TWO types of transports for the army are shown here receiving tests at the Camp Holabird, Md., Quartermaster depot. The small car is a quarter ton, four wheel power truck that can be used for the rapid transport of troops and weapons, especially in situations where cover is essential, and the larger truck is a six-ton, six wheel truck used to transport three-inch anti-air craft guns and mount.

CALIFORNIA Cops

Above: These student officers are learning the rudiments of photography. All phases of the work are covered from camera to chemicals. Below: Officers learning police broadcasting from Lieut. Douglas.

by Andrew R. Boone

OF TWO shots fired into a victim's head from close range, powder burns fringe only one. Why? How do fumes from iodine crystals bring into sharp relief an old fingerprint, and how may the latent ridges be transferred to a card for permanent keeping? What part do shadows play in photographing evidence at scene of crime? How may arrests of lawbreakers be made more sure and faster, and conviction of wrong-doers certain?

Ten thousand constables, cops, sheriffs' deputies and liquor control officers in California have begun learning the answers to these and a thousand other questions. In a statewide program started four

Go Back To School!

California's police are now receiving the type of advanced education that will enable them to solve the most baffling crimes in short order. All the best modern methods of scientific crime detection are being taught these men, in twenty-seven different training schools.

Right: Brawn is developed with brains at the regional school.

years ago, they attend 27 schools supervised by George H. Brereton, police education expert, including annual sessions at both the Los Angeles and Berkeley branches of the University of California. In classroom, gymnasium and the field, California's law-enforcement officers study brain teasing questions, learn to wrest guns from stick-up artists, handle deadly explosives and gas without endangering their own lives. To date 2,669, from rookies to old-timers, have "graduated" from the various schools. In time, all will have left their beats to crack books and learn by practice the newest scientific methods of stalking criminals and bringing them to judgment.

Until recently, little thought was given to organizing police education. New York, Pennsylvania, Oklahoma, Wisconsin and Virginia maintain state programs. Several years ago, certain California legislators proposed establishment of a state police force, abolishing city and county departments. Local politicians balked at this scheme, and countered with a proposal for state schools and cooperation between various agencies. Brereton, then undersheriff in San Diego county, was called in to head the program. He found many officers were "bungling evidence at the scene, testifying inadequately and losing convictions, overlooking pickups because they failed to recognize suspects." Crime and murder were increasing.

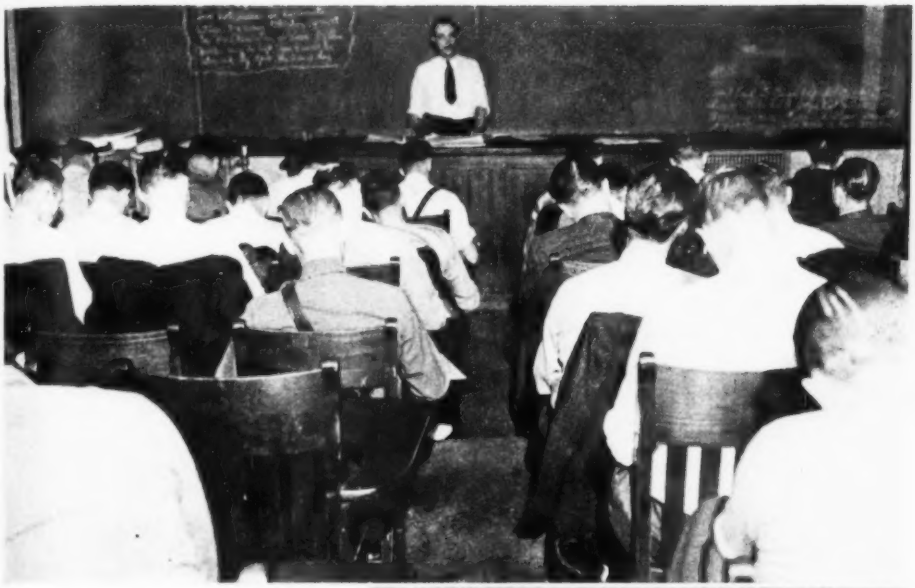
Brereton swung into action. Quickly he organized nine zone schools. Sometimes 152 officers from several communities gather at a county seat to hear lectures by officers from larger departments. Departmental schools sprang up, meeting every week to keep those trained in the zone courses on their toes. Men seeking jobs with police departments attend pre-employment schools in three junior colleges. Ten schools for training officers to teach others have turned out 257, all capable of passing along the newest techniques, from administration to portrait parleys. Junior college principals, judges and lawyers lecture to scores of classes.

Above: Learning the science of fingerprinting from experts. **Left:** Bringing out fingerprints on a little pasteboard box by the use of iodine fumes.

At first, old-line officers were reluctant to knuckle down to what they considered high falutin' theories. Slowly, Brereton convinced them they owed both the public and themselves the obligation of keeping abreast with scientific progress. Today more than one officer has solved crimes he would have muffed before the schools were started; not a few are alive now only because they became marksmen with pistols and revolvers, or learned to handle like fragile eggs, nitroglycerine and dynamite left by safe crackers.

Recently I sat with several score officers

Below: Police students learn how to scale walls quickly.



Above: Capt. Frank L. Coe, of the Los Angeles Sheriff's Department, addresses a few of the many thousands of student police officers. Below: Learning the technique of police photography at the school by actually photographing a board.

attending University of California classes. Many never had attended college, yet they plunged into a variety of subjects with the enthusiasm of freshmen. Crime prevention; description of persons; how to search for evidence, from the scene of a crime to the morgue; how to fire gas guns and bombs; how to make "legal photographs" which reveal all, and hide nothing; how to disarm suspects, use disguises and blinds, beat bunco racketeers and make the streets safe for children. Instructors threw the book at them for two weeks. No final examinations tested their knowledge at the end. Each man was expected to gain what he considered useful.

Step with me into Room 124 of the Chemistry Building on the northwest corner of the rolling campus. It is eight in the morning, and Capt. Virgil P. Gray from the Los Angeles County Sheriff's office displays a series of enlarged photographs. Each shows a corpse, struck down by a murderer. Not pleasant, these pictures. But they reveal details from which each alert officer should draw sound conclusions. Here's one, less gruesome than the others. Beautiful young woman, blondish hair, struck by two bullets along the rear edge of the right temple.

"Note," he is saying, "powder burns encircle the lower wound, while none appears above. What does this mean?"

After a pause, "She must have thrown up her hand in protection," said young Dennie

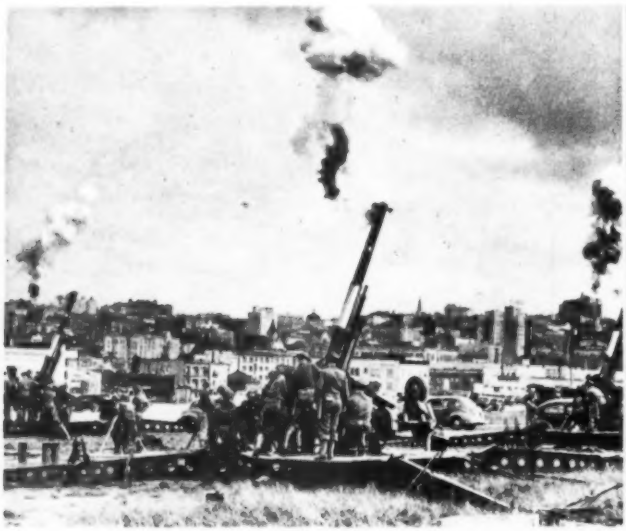
[*Continued on page* 152]

Shield Protects Bicyclist

THIS bicycle shield protects the rider from wind, rain, and dust. A transparent window at the top affords perfect visibility without danger, a flexible material being used. The entire structure is curved to streamline it. It is light in weight, and can easily be fastened to any standard make of bicycle by means of attached straps.

Aids Air-Raided Airedales

SOMEWHERE in England some women are shown carrying somebody's dog. The box-like stretcher being used is one devised by The National Air Raid Precaution Animals' Committee. The stretcher is designed to permit workers to slide injured animals into place without danger of being bitten. Special ambulance is in background.



Antiaircraft "Blankout"

CITIZENS of Seattle jumped out of bed on a recent Sunday morning to investigate the booming of big guns downtown. They found these members of the Washington National Guard firing newly mounted antiaircraft guns at low flying "enemy" planes. The guns were loaded with blanks as were the machine guns of the planes. Relieved, the citizens went back to bed.

Aerial Photos From The Ground

SAN ANTONIO, TEXAS, may well be proud of Omar Gonzales who is shown holding his balloons. The tiny camera on the frame beneath the balloons snaps aerial photos when the proper altitude is reached. Omar originally used kites for the purpose but parts of the kites showed on the print, as can be seen in the right hand photo, taken from a kite.

No Boom In This Business

WHEN Nicholas Koch goes to work with a torch on the gas tanks of Los Angeles automobiles there is no danger. When his welding business dropped during the depression he got the idea of displacing gas-tank air with non-inflammable exhaust gas. Since then, he has welded 2000 tanks with high profit and safety.

January, 1941

Above is the *City of Bangor*, frozen into the ice of Lake Michigan after its rudder had been torn away by pounding seas, and the ship itself had been abandoned. The following year, the ship was trapped again, this time in the stormy, icebound Lake Superior.

Racing DEATH Down T

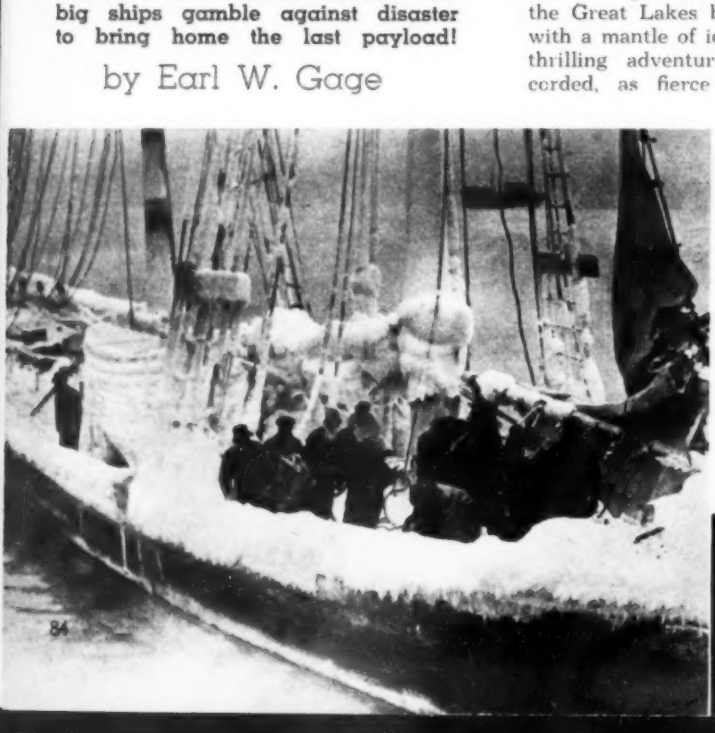
Each year, across the treacherous waters of our "inland oceans," the big ships gamble against disaster to bring home the last payload!

by Earl W. Gage

IN THE early winter they will set forth—the ships making the "Last Trip" down the Great Lakes before they are closed in with a mantle of ice. Each season new and thrilling adventure and tragedy are recorded, as fierce Arctic blizzards sweep disaster and death into these storm-tossed inland seas.

Last year the sailors on the lakes, thanks to favorable weather, and calm waters, were able to shuttle to and fro across the lakes until almost Christmas. But a few, bolder and more hazardous, paid the supreme sacrifice, because they set forth too late.

All through the



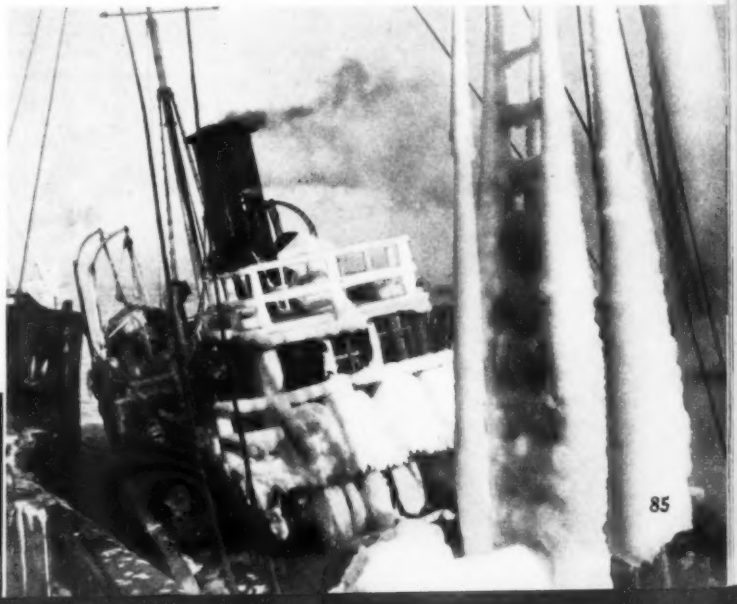
Left: An ice-incrusted schooner puts into port after braving the Great Lakes in winter.

n The GREAT LAKES!

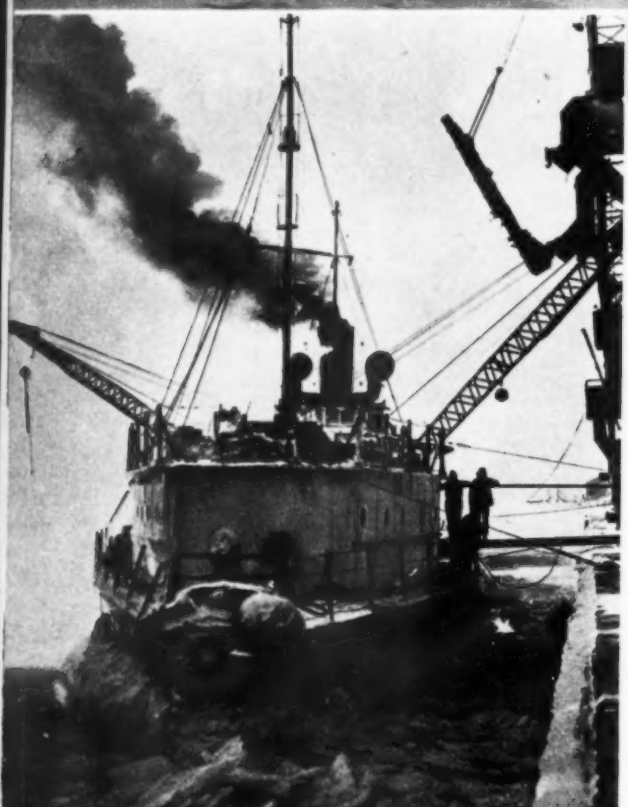
bitter night—a night that caused the boldest sailors to shake dice with death—the lake freighter struggles on across the boiling waters. Her powerful engines throbbing to the bursting point, her pilot and skipper on continual watch, the 500-footer drifts like a toy on the ferocious waters.

"The worst storm in forty years on these lakes," the skipper cries into the pilot's ear. And so it was, for old-timers could remember no night to compare with that one, when a score or more ships were caught far out at sea by a storm which suddenly howled down out of the North to bring disaster to the unfortunates on these waters.

Towering, thunderous, greenish, livid walls of water were thrust up beside the ship, closing out the rest of the world. Down, down, down to the bottom of the great troughs. Back up, up, up to the crest of the watery wall, with



Right: A lake steamer docks at the head of the Great Lakes after a death-defying race with winter.



Above: A fleet of Great Lake grain ships awaits passage through a canal. Left: A freighter bucks icy waters to reach safety.

A sailor aboard a Lake's freighter stands at the ship's bell and looks out over the icy, treacherous waters of our inland "oceans."

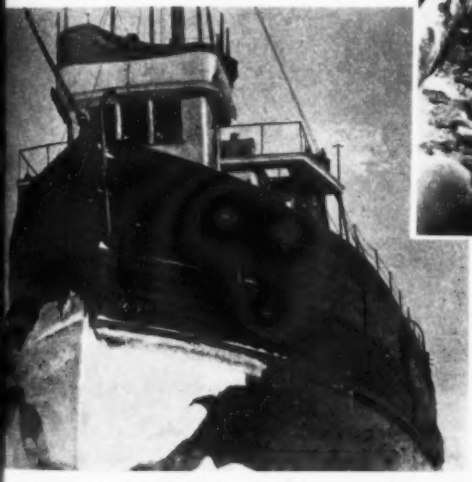
the long ship perched perilously on the summit, both ends exposed to the great gap of a trough, with every beam and seam strained until it seemed she would fall apart.

"The rudder! The rudder is gone!" cries the pilot, as the unresponsive wheel spins round and round like a top. Blood froze in the veins of the steersman, for now he knew they were truly on a race with death.

Adrift somewhere far out on the surging bosom of Lake Superior, the lake vessel was supremely in the power of the storm goddess. Trapped upon a floating coffin, helpless to guide her course, the pilot knew that only a kind Providence could save the crew of twenty-two men.

Lashed by a 90-mile gale, waves dashed 40 and 60 feet high all about, carrying the helpless ship up and down like a chip. The thermometer dropped to 30 degrees below

Above: The skipper of a Great Lake freighter at the wheel of his ship. Right: Hundreds of tons of ice mantle this hardy ship from stem to stern.



Above is the *City o' Neff* which was given up for lost on the wintry waters of Lake Michigan, but was finally discovered after four days, imbedded in the northern lake ice.

Below is a freighter passing through the Canadian Locks at Sault Ste. Marie, joining Lake Superior and Lake Huron.

zero, while a razor-edged wind cut the thinly clad crew to the marrow. Most of the men were trapped in the quarters in the stern, with the skipper and pilot in the bow. That 400-foot steel deck between soon became a glassy surface, on which no man could walk. They were hopelessly separated.

Hundreds of tons of ice soon coated the ship from stem to stern, weighing her deeper and deeper into the raging sea. Only her evenly distributed, heavy cargo, plus the outer mantle of ice, kept her from flip-flopping and casting the men into the running sea.

Only a few hours before, the *City of Bangor* had set forth confident of victory in the race with the elements, hoping to complete another run before Jack Frost and King Winter put an end to lake traffic. Now they were hopelessly trapped on a raging sea, before a terrific Arctic wind.

[*Continued on page* 148]

Science Restores Dog's Hearing

SINGER Jean Dickenson's little dog, Gilly, suddenly went deaf. He had loved to sit and listen to his mistress practicing. He had toured the country with her, enjoying operas, symphonies, and radio programs—then deafness made his life a tragic void. Miss Dickenson called experts from a large manufacturer of hearing aids, and they adapted their device to the dog. Although designed for humans, it worked on music-loving Gilly.

Cops' Nightmare Does 140 M.P.H.

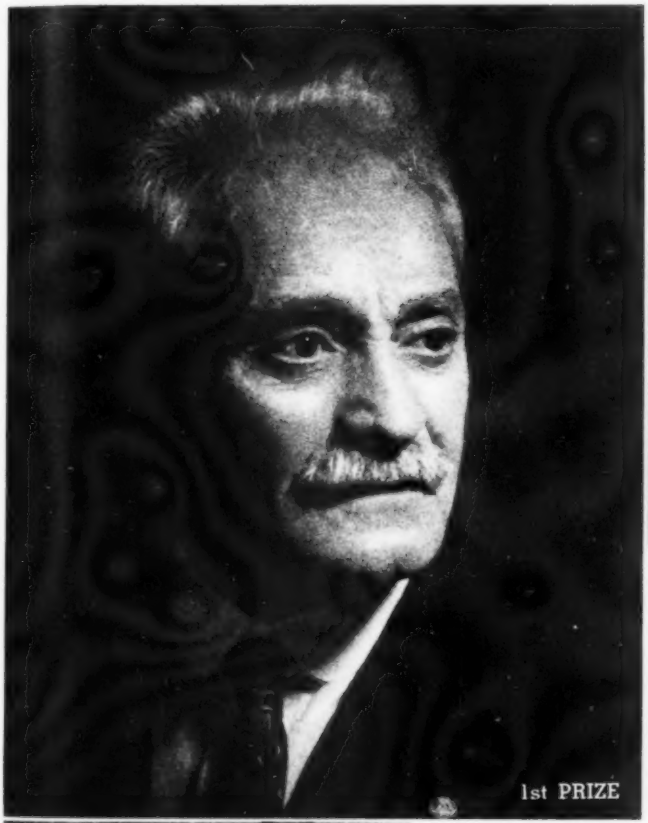
KNOWN as the "Whizzer," this super - streamlined speedster can travel at 140 M.P.H. with a fuel economy of better than 41 miles per gallon. According to its designer and builder, Bill Clark, of Rosedale, Oklahoma, the car can turn completely around at 60 M.P.H. The unusual design of the rear wheel steering gear is largely responsible for this maneuverability. The airplane type rudder turns with the wheel.

Biggest Hog Gets Sprinkled

PRETTY Marjorie Watson affectionately sprinkles "High Light Again," a husky hog that tips the scales at more than half a ton. The portly porker will leave his home town of Chino, California, to take part in the Great Western Livestock Show in Los Angeles. Believed to be the world's largest hog, the animal receives meticulous care at all times. Daily bathing is part of the regular routine. The sprinkling keeps him cool and comfortable.

MECHANIX ILLUSTRATED PHOTOGRAPHY SECTION

PAGES 89-94



1st PRIZE

2nd PRIZE

PHOTO CONTEST

Anthony Ficalora, 2262 28th St., Astoria, L. I., N. Y., leads off this month's prize winners ($10.00) with a fine texture screen portrait; on S.S. Ortho Portrait, in Agfa 17. SECOND PRIZE ($5.00): "Watchful Waiting" by C. R. Dole, Long Beach, Calif. THIRD PRIZE ($4.00): "Table Top Study" by Mrs. J. Lloyd Zimmerman, 66 Melrose Ave. S., Hamilton, Ontario; taken with folding camera and portrait attachment. FOURTH PRIZE ($3.00): "Witching Ways" by Paul Hadley, Piggott, Ark., taken with five banked photofloods and a sixth inside the pumpkin.

Submit contest prints unmounted—no larger than 8x10 inches. With each print list your camera film, lens opening and shutter speed, illumination, and developer. Write your full NAME and ADDRESS on each print. Wrap with corrugated or cardboard stiffeners and enclose postage for return. (Published prints will not be returned.) Address Photography Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y.

4th PRIZE

3rd PRIZE

Print Greetings from

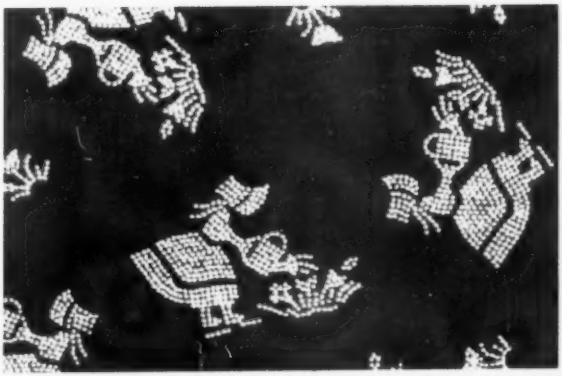
by
Norman K. Morse

IF YOU'RE stuck for a novel, greeting card idea at this late date, you might try a hand at contact printing your Christmas tissue wrappings. Seasonal wrapping paper designs are usually full of fun. They show symmetrical little dogs, inebriates, funny people, and all the little patterns so symbolic of the holidays. The layout here will give you a hint of the wide variety of possible subject matter.

To do the job, you merely place the wrapping paper in the contact printing frame where the negative would ordinarily go. Use any regular chloride contact paper, preferably one of hard contrast grade. Expose

Cutouts made from decorative wrapping tissue (left, below) are used as "negatives." The resulting contact prints form the basis of the final greeting card; only the lettered or written greeting need be added while printing each.

Christmas Wrappings!



At the left, are a pair of completed "wrapping tissue" greetings. Lettering is done with India ink—on the paper or on a clear piece of fixed-out film.

• • •

At right and at right top, are still another pair of greeting ideas. The one at the top was printed by contact from a bathroom curtain—note the background texture.

briefly to a strong printing light and develop a little more fully than usual so the blacks will turn out as deep as possible.

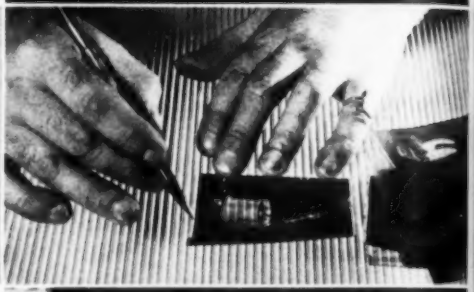
Lettering may be done on the wrapping paper itself or on a clear piece of fixed out photo film sandwiched in at the bottom of the frame during printing. Use India ink . . . Fold-over cards may be made by using paper twice the size of the wrapping paper cutout, and bending. And the final results may be hand-tinted or immersed in paper dyes of various kind. Also try contact printing the designs from bathroom curtains and materials like ribbons, cellophane, etc.

Don't use transparent or translucent materials of green, yellow, orange or red color. Contact printing papers are color blind and will print black only with white or blue light.

Ken Murray Suggests:

1. Using Nail Polish as Print Varnish.

Right: When you wish to preserve a small snapshot print, coat it with ordinary liquid nail polish. Prints treated in this way may be handled indefinitely without showing wear or permanent finger marks. Special effects may be produced by colored nail polish.



2. Marking Contrast on Negative Margin.

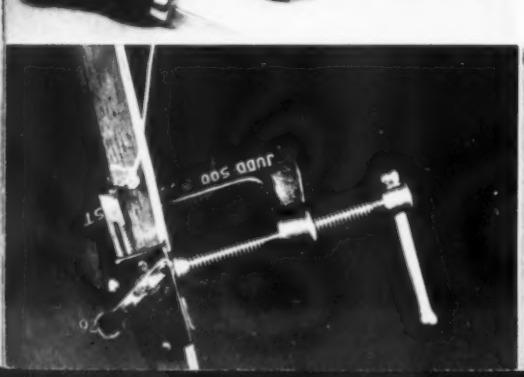
Right: After determining which printing paper contrast a negative calls for—by making a record print—reduce the time of future reprintings by indicating the contrast on the negative's margin with a two-colored pencil. Use red, for example, to signify need of soft paper, and blue, the need of hard. Lack of a mark would indicate a "normal" grade of paper.

3. A Quick-Dry for Oil-Colored Prints.

Right: If you are in a hurry with your oil-colored prints, you needn't go through the usual two or three-day wait. Merely, mix a trace of Japan drier with the oil-color before applying; the drying will then take a few hours.

4. Fitting New Points to Tripod Legs.

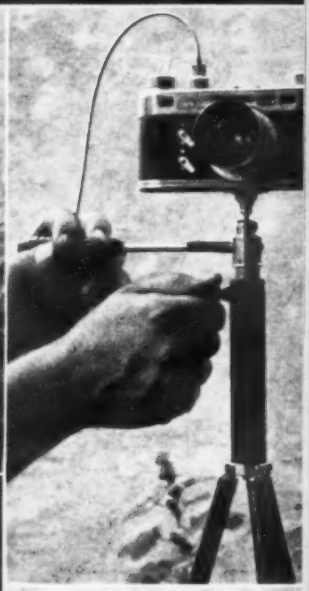
Left: The metal points fitted to most wooden tripod legs usually dull quickly and lose their holding ability. They may be removed with pliers and replaced by short lengths of ice-pick steel ground to a point. Being hard the latter hold indefinitely.



5. Prolonging Self-Timer Release Delay.

Left: The usual 6 to 10 second working time of the average self-timer may be prolonged so the photographer can "compose" himself comfortably in the picture. Clamp the self-timer to the tripod leg with a cord attached to the *manual* release of the camera. Some 20 seconds pass before tensioning of the cord trips the shutter.

"No-Stoop" Tripod Extension



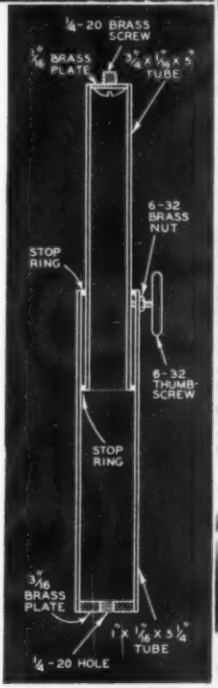
The tripod extension permits use of camera at eye-level position, left. Without it, you have to stoop.

by Fred S. Jurkowski

CAMERA enthusiasts are often handicapped by the low height of their tripods which forces them to squat down into awkward positions to sight subjects in their view finders. In order to extend the height of the tripod, the writer has devised a simple and inexpensive telescoping extension tube which raises the camera from five to ten inches above the normal tripod height. Aside from its usefulness in increasing the height of the tripod, the device is very handy for "panning" purposes in its closed position.

The sketch shows the relationship of the parts. The outer tube, which may be brass, steel, or any other hard metal $\frac{1}{16}$-in. thick, has a 1-in. outside diameter and is 5¼-in. long. A circular brass plate $\frac{3}{16}$-in. thick is soldered into the bottom of this tube, and a hole is drilled and tapped in its center to take the ¼-20 mounting stud atop the tripod. Drill a hole near the top of this tube and solder a 6/32 brass nut over this hole. This nut takes the 6/32 thumbscrew, which is used to lock the mechanism at the desired height. The inner tube (same gauge) is three-

[*Continued on page* 133]



Drawing, above, shows all construction details. Photos at top and above illustrate how the height of the camera can be varied when the extension device is used.

The simple cross-piece can be utilized as above. Note how easily the cross-bar can be swung, when attached by the swivel.

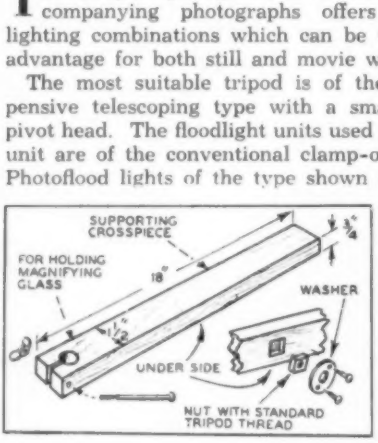
Portable Studio Light

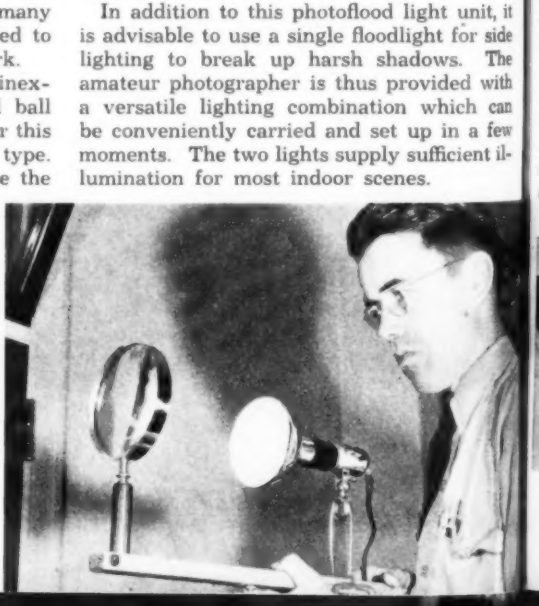
by M. G. Winterton

THE simple lighting unit shown in the accompanying photographs offers many lighting combinations which can be used to advantage for both still and movie work.

The most suitable tripod is of the inexpensive telescoping type with a small ball pivot head. The floodlight units used for this unit are of the conventional clamp-on type. Photoflood lights of the type shown are the best for this purpose. However, this arrangement can be used satisfactorily with metal reflectors also.

In addition to this photoflood light unit, it is advisable to use a single floodlight for side lighting to break up harsh shadows. The amateur photographer is thus provided with a versatile lighting combination which can be conveniently carried and set up in a few moments. The two lights supply sufficient illumination for most indoor scenes.



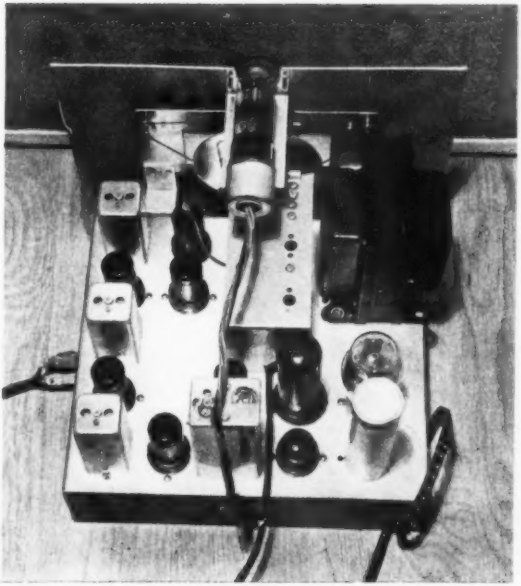


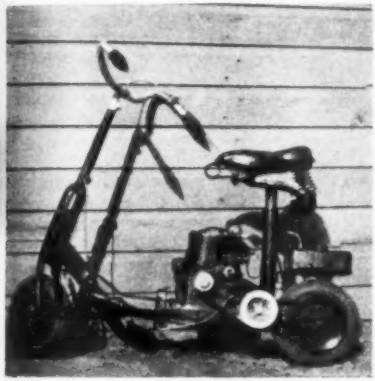
Right: This simple arrangement converts the photoflood into an effective spotlight. Details for attaching the magnifying glass sketched above.

How to Build SECTION

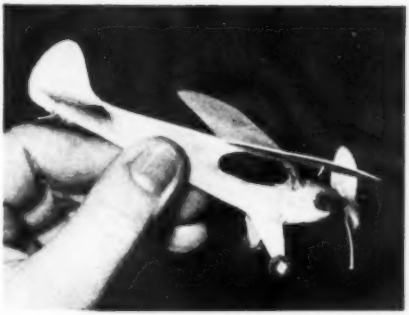
IN THIS ISSUE

Pictured here are a few of the selected projects you can build from detailed plans and instructions given in the following pages.





"Midgie," Motor Scooter. Knee action "floating ride" and 2 speed drive are among the features of this scooter. Plans start on page 116.

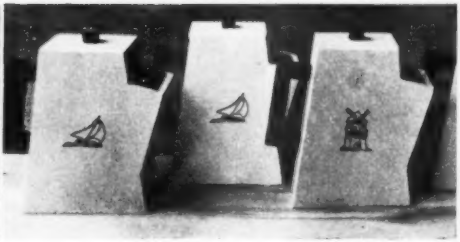


Here It Is! The *FM Special*, a real, brand new frequency modulation set that you can build yourself at low cost. Turn to page 98.

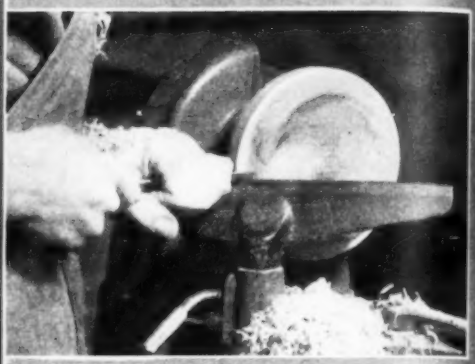
Tiny Flying Models. Actual miniature flying scale models of famous airplanes. Page 124.

Decorative Workshop Projects. Attractive picture frames and the linoleum printed wooden pitchers shown below are on page 128.

Smoker's Ash Carts. Novel cigarette ensemble that will make an ideal Christmas gift. See page 105.



The CRAFT



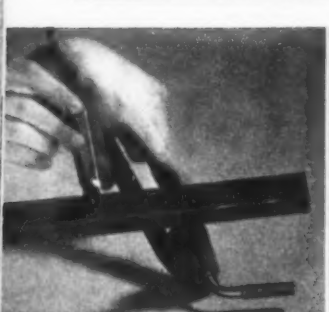
At the left is a photograph of the finished spun candlesticks. Directly above, a lathe worker is shown turning out the wooden chuck, or spinning mould for the base of the copper ornament.

Here is a project that will help you to learn a new type of lathe work. After you have done it once successfully you can apply the method to other articles of suitable design with the same results. A perfect finish is easy to get.

by Harry L. Smith

SPINNING a beautiful, practical set of candlestick holders can be a pleasant job for any craftsman having a lathe of the wood or metal working type.

Sufficient tools and equipment for spinning may be had for a small investment since there are available several reasonably priced makes of tools suitable for spinning on light lathes

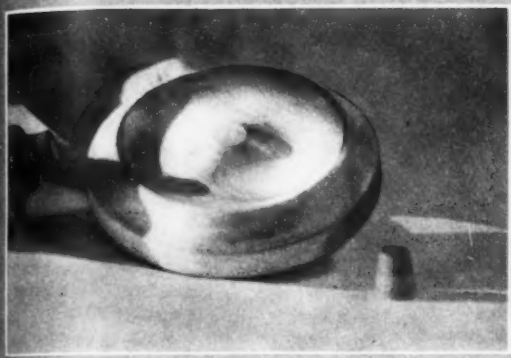


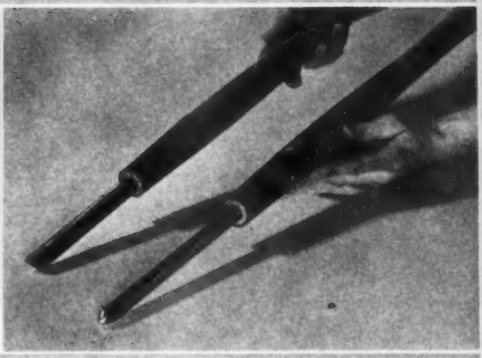
The metal bar with the holes in it at the left is mounted in place of the standard tool rest so that the metal rod shown can be inserted to form a tool fulcrum.

Below, a trimming tool is being used to cut off the irregular edge of the spun metal. Note the heavy leather glove worn to protect the hand if the metal flies.

This is the correct way to hold the spinning tool. The end of the handle is held between the arm and body. The worker leans slightly to apply the pressure

# of METAL SPINNING





Above left: The chuck for the base of the candlestick and the chuck for the cup into which the candle is inserted. Also block. Upper right: These are the tools with which the turning job is done. Pointed tool does the shaping. The edge tool trims it.

In addition to the tools themselves, a spinning center will be a great help and, although possible to get along without one, in the long run you will need a center for your larger jobs. The spinning center is just what the name implies, a center that spins or rotates. It is a center having a thrust bearing built into a cup or container and allows pressure to be put against the metal disc, thus holding it in position between the follow block and the chuck or form. A little ingenuity will aid in fashioning your own if you don't care to purchase one. (See sketch of spinning center.)

In spinning, it is customary to work over a form or chuck. Although some of the softer woods can be used for chucks if necessary, they will only hold up for one or two jobs before they go to pieces, so hard wood is the only thing worth considering. Hickory and maple are both excellent woods for this work; either one will do nicely, though most professional spinners favor maple because of its closer grain (there being less chance of grain marks appearing in the spun metal shell).

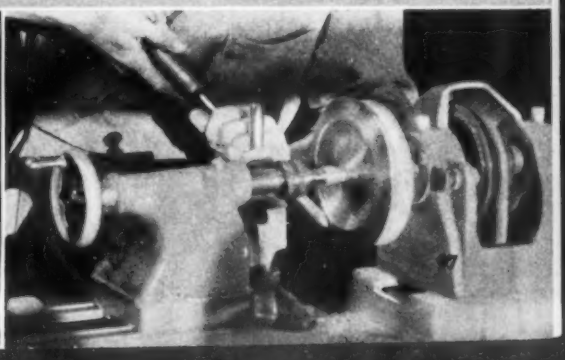
To get down to business, mount an inch piece of maple on the faceplate and turn it to a diameter of six inches. Drawing gives radii of the chuck.

The chuck for the candlecup is turned from a piece of maple 1x1½". The drawing gives dimensions for the chuck.

For a follower block turn a small piece of hardwood about an inch long and ½" in diameter. The follow block is usually turned so that its nose diameter is about ¼" less than the diameter of the chuck it exerts pressure against. For example, the center of

[*Continued on page* 130]

The two photographs below show the correct position of the tool at the start of the spinning job and near the completion. Note that the tool is pointing downward as the outside edge of the work is shaped. The follower block is plainly shown in position.



The "FM-Special"

by M. L. Muhleman

Build this ultra-modern super-heterodyne receiver and enjoy the thrilling radio programs now being broadcast by the new "frequency modulation" transmitting stations all over the country.

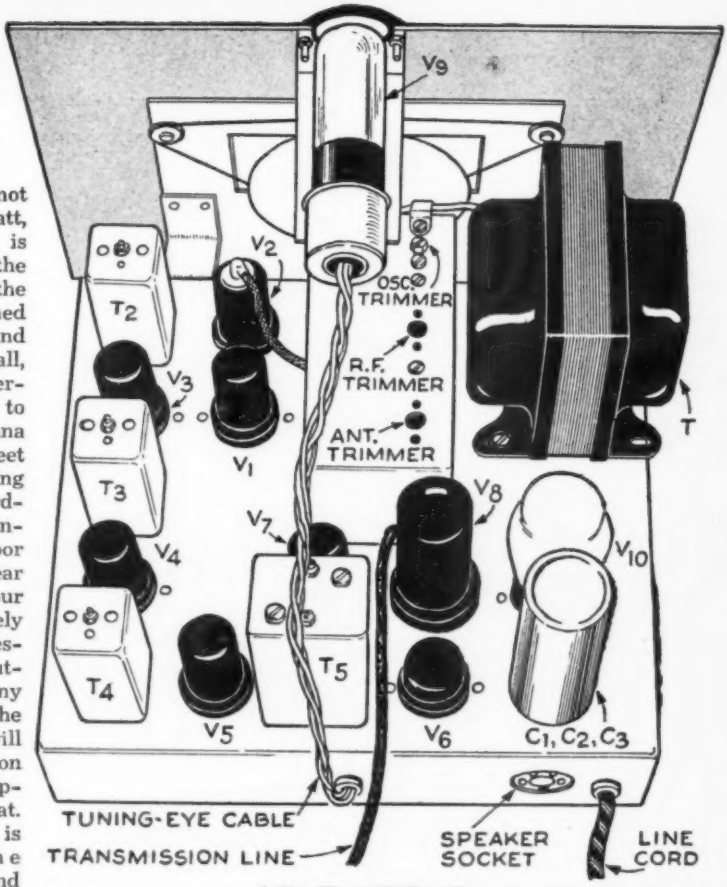
Left: The receiver is shown here without a cabinet, resting on the large loud-speaker cabinet. The chassis can easily be mounted in a book case or in a small wooden cabinet of its own. Below: The author is holding the high-efficiency speaker unit used with the FM Special.

AS THIS article is being typed, the author is immersed in a roomful of high-quality sound set against a background as silent as a tomb. He is, of course, listening to a program from a frequency-modulation broadcast station.

Nothing unusual in that, except that the author and the f-m receiver to be described are conveniently and comfortably located in a first-floor apartment less than six feet above ground. and the receiver is operating from a folded antenna strung around the back of the speaker cabinet. No special doublet on the roof, no long transmission line, no wires draped around the living room—just so many feet of aerial built into the set. With no more than this, f-m stations with as little power as one kilowatt and some fifteen to twenty miles distant are picked up without the slightest difficulty.

You can enjoy the same convenience and obtain equally as good results providing—and these are variables—that you are located no more than twenty miles from the f-m station or stations you wish to receive, that

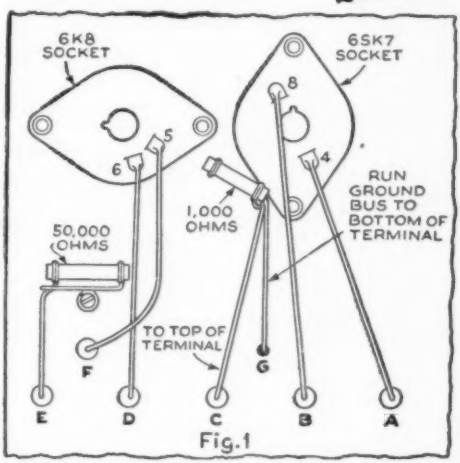
Right: Back view of the chassis of the FM Special. The layout is simple and symmetrical. The various parts are marked to correspond with the symbols in the schematic diagram on the next page.



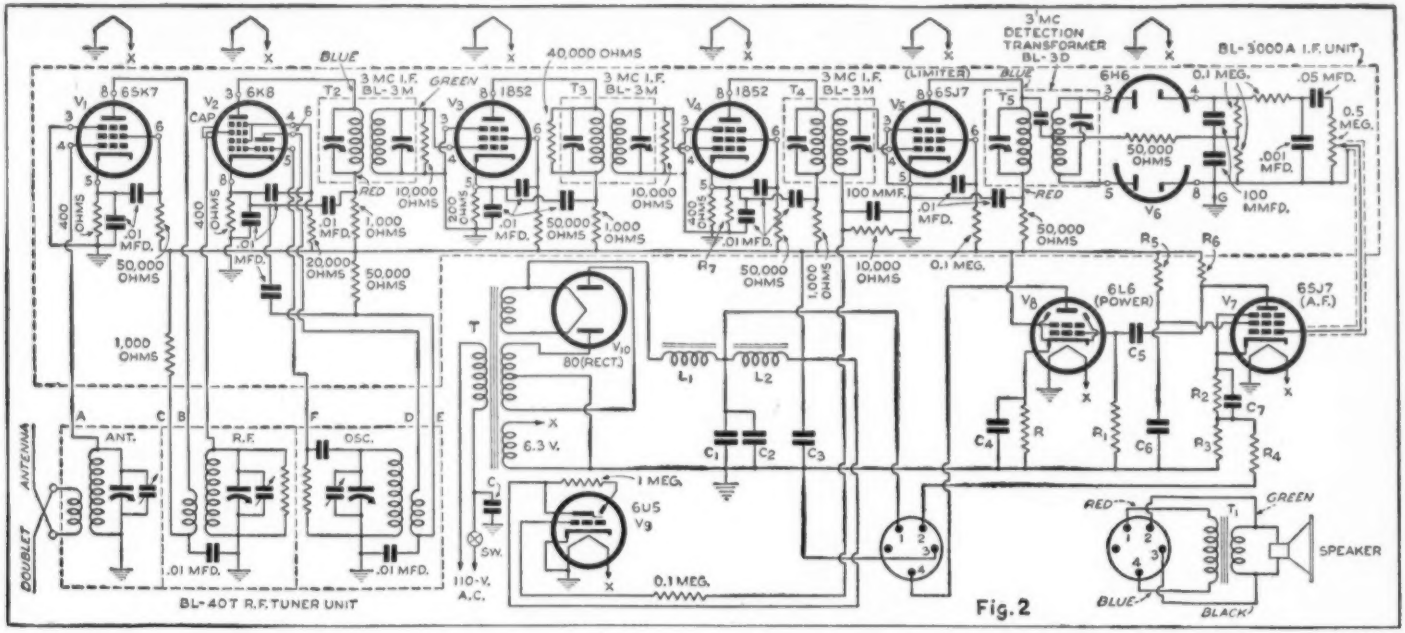
the power of each is not less than one kilowatt, that your location is moderately open (the building in which the author lives is screened on one side by a hill and on another side by a tall, steel structure). Otherwise, you will have to get the folded antenna higher than six feet above earth (by moving into a second- or third-floor apartment, for instance!); use an indoor antenna strung up near the ceiling; or, if your location is absolutely putrid, it may be necessary to resort to an outside antenna. In any event, the receiver's the thing, and this one will knock your conception of high-quality reception into a cocked hat.

The "FM Special" is built around the Browning BL-40T and BL-3000A frequency modulation units. The former is the r. f. tuner, the latter the i. f. and detector unit. Both come from the factory completely wired and aligned, leaving nothing for you to do but fasten the BL-40T to the chassis (which is part of the BL-3000A i. f. unit) and make the few connections shown in Fig. 1. If you want this done for you, get the BL-304-6D, which is the 40T tuner, the 3000A i. f. amplifier and the 6D dial, completely wired and aligned.

On the other hand, if you're a hound for work you can get the punched chassis (100C), the i. f. transformers (3M), and the discriminator transformer (3D) separately, and do your own assembling and wiring. The values of the resistors and condensers associated with the BL-3000A unit are given in the schematic diagram of the complete receiver, shown in Fig. 2. But, unless you know your onions, and have the necessary test



This close-up shows the connections to be made from the BL-40T r.f. unit to the BL-3000A i.f. unit: A—to 6SK7 socket terminal No. 4 (grid). B—to 6SK7 socket terminal No. 8 (plate). C—to insulated soldering terminal (1000 ohm resistor). D, E, F and G as indicated.



Schematic diagram of the complete "FM Special" receiver. Components within the upper dotted lines are included in the BL-3000A chassis unit; those within the lower dotted lines in the BL-40T unit.

PARTS LIST

R.F.—Browning BL-40T R-F Unit.
I.F.—Browning BL-3000A I-F Unit.
V1—Type 6SK7 (RCA).
V2—Type 6K8 (RCA).
V3—Type 1852 (RCA).
V4—Type 1852 (RCA).
V5—Type 6SJ7 (RCA).
V6—Type 6H6 (RCA).
V7—Type 6SJ7 (RCA).
V8—Type 6L6 (RCA).
V9—Type 6U5 (RCA).
V10—Type 80 (RCA).
C—.05 mf. 400 v. paper condenser (Solar S-0228).
C1, C2, C3—8+8+8 mf. 450 v. electrolytic condenser (Solar D-838).
C4—25 mf. 25 v. electrolytic condenser (Solar DT-882).
C5—.01 mf. 400 v. paper condenser (Solar S-0219).
C6—0.1 mf. 400 v. paper condenser (Solar S-0238).
C7—10 mf. 25 v. electrolytic condenser (Solar DT-879).
R—200 ohm 2 watt resistor (IRC BW-2).
R1—250,000 ohm ½ watt resistor (IRC BT½).
R2—500 ohm ½ watt resistor (IRC BT½).
R3—50 ohm ½ watt resistor (IRC F-½).
R4—50 ohm ½ watt resistor (IRC F-½).
R5—2 meg. ½ watt resistor (IRC BT½).
R6—500,000 ohm ½ watt resistor (IRC BT½).
R7—Optional (see text) 400 ohm ½ watt resistor (IRC BT½).
T—Power transformer, 750 v., ct., 120 ma. (Kenyon R-205).
T1—Output transformer, 2500 ohm pri., 6 ohm sec. (Jensen Z-2754).
L1—Filter choke, 8 henries, 120 ma. (Kenyon KC-90).
L2—Filter choke, 20 henries, 65 ma. (Kenyon KC-200).
SPK—8" permanent magnet high-fidelity speaker (Jensen PM8-CT).
Sockets—Two octal, 8-pin wafer (Amphenol).
Plug—For speaker cable; 5 prong (Amphenol PM5).
Cable—Four wire, length required (Lafayette K16154).
Tuning Dial—Browning 6D Slide Rule Dial.
Aerial Lead—Twisted pair, length required (Lafayette K20935).
Insulators—Six midget stand-off, for aerial (Johnson No. 24).
Line cord and plug.
The approximate cost of the complete receiver is $63.00.

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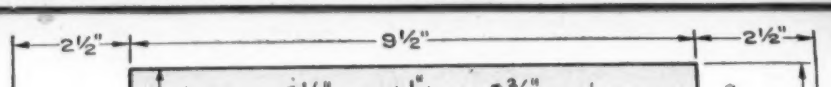
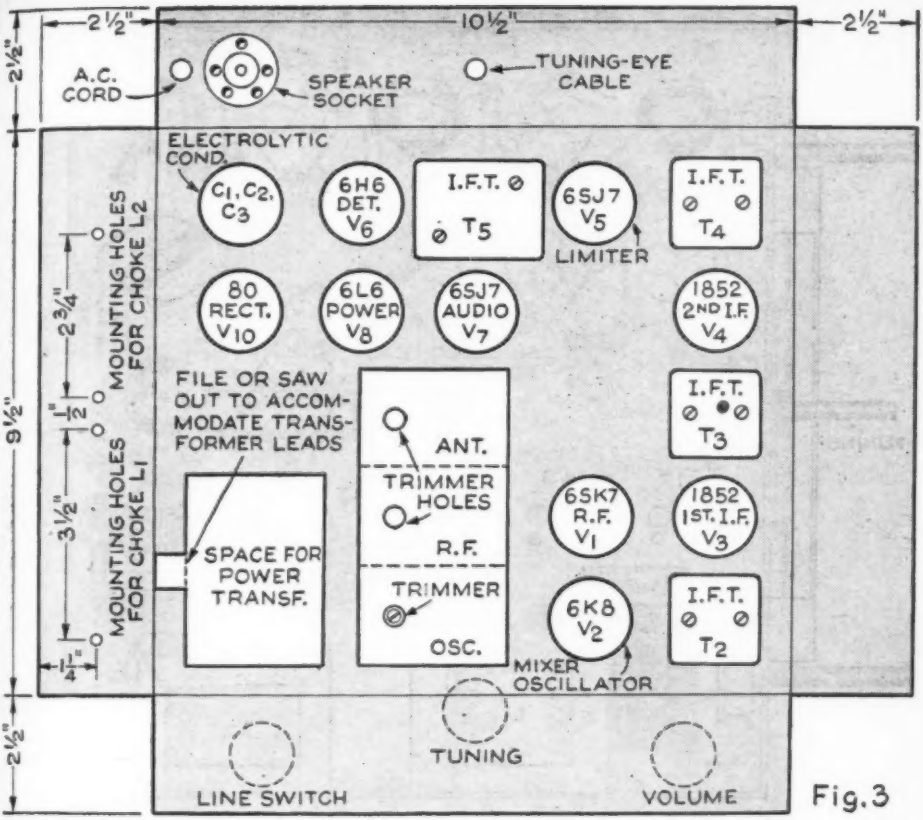




Chassis layout of receiver. With the exception of the cut-out for the power transformer and the mounting holes for the chokes L1 and L2, no drilling or sawing is required.

equipment on hand, you'll never get the receiver properly aligned. If you don't know your onions, turn the aligning job over to a radio serviceman.

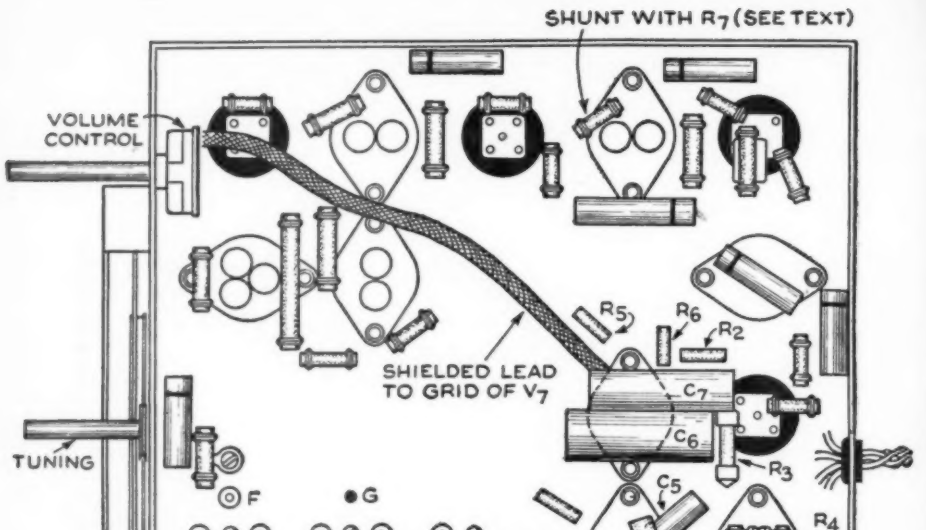
The remainder of the receiver consists of the power supply and the audio amplifier, both built into the 3000A chassis, which is punched to accommodate just such a layout. The location of each component is shown in Fig. 3.

The technical features of the receiver can be analyzed by reference to the schematic diagram, Fig. 2. There is a tuned r. f. stage followed by a combination mixer-oscillator. The mixer feeds two high-gain i. f. stages tuned to a frequency of 3 megacycles. The tuner covers a range from 41 to 51 megacycles.

The limiter (V5), which is a particular kind of i. f. stage designed to obstruct the passage of noise, is coupled to the 6H6 discriminator-detector (V6) by means of a special type of i. f. transformer (T5).

The audio output from the detector is fed to an audio amplifier stage employing a 6SJ7 pentode (V7). This tube drives the 6L6 beam-power amplifier (V8). Both stages are heavily loaded with inverse feedback. The feedback voltage is taken from the voice-coil winding of the output transformer T1 and fed into the cathode circuit of the 6SJ7 audio tube V7 through resistor R4. This arrangement—pentode amplifier, single power tube and heavy inverse feedback—provides an almost distortionless audio system with an output of six watts, without having to use a push-pull stage. And six watts is far more volume than you can comfortably use.

Moreover, the output of the amplifier is designed to match the power-handling capacity of the Jensen high-fidelity speaker,



Underside of the chassis, showing the placement of the major parts. The resistors and condensers that appear to be hanging in midair are actually supported by their own short terminal wires.

which is also six watts. Hence, there is little likelihood of overloading the speaker as there would be if the amplifier power output were ten or twelve watts. Since the frequency range of the speaker is 50 to 10,000 cycles, every precaution had to be taken to reduce harmonic distortion to a negligible point, for the wider the audio range the more noticeable is any distortion that may be generated in the receiver or amplifier.

The power supply is conventional, except that choke input is employed rather than condenser input. A total of 16 mf. filtering capacity is connected from the midpoint of L1 and L2 to ground. The third 8-mf. section of the triple-section electrolytic condenser C1-C2-C3 is hung across the output.

The grid of the 6U5 tuning-eye tube (V9) is connected to the high side of the 10,000-ohm resistor in the grid-return circuit of the limiter tube, V5. Since an increase in signal amplitude will develop a larger voltage across this resistor, due to the flow of grid current, the "eye" will vary accordingly. When the signal is properly tuned in (maximum amplitude) the "eye" will register maximum closure, or close to it, as will be explained later.

In constructing the receiver, first mount the 40T unit and wire it as shown in Fig. 1. Do not make any abrupt bends in leads A, B, C, D and E. Curve them. Then mount the two wafer sockets for the 6SJ7 and 6L6 audio tubes, V7 and V8, with the key positions facing left when viewing the chassis from the front. If the chassis is to be mounted in a vertical position, with the tubes in a horizontal plane, remove the socket for the 80 tube (socket comes with chassis) and remount it so that the large pin holes 1 and 4 are in a horizontal plane.

Proceed by wiring in the audio sockets.

Draw in the shielded output lead from the volume control, cut to proper length, and connect the lead proper to the grid of the 6SJ7 a. f. tube, V7.

Next, file or saw out a slot in the power-transformer cut-out on chassis so that the transformer may be mounted near the chassis edge. Use the transformer mounting lugs as template and drill necessary holes. Mount transformer and clip off the leads not to be used. Wire transformer to line switch SW and the a. c. cord to the 80 socket and to the common heater lead for the other tube sockets.

Then mount the triple-section electrolytic condenser C1-C2-C3 in the hole to the rear of the 80; and the choke L2 by means of the bolt holes so provided in the left chassis apron (Fig. 3). Follow by drilling the two holes required for mounting choke L1, as shown in Fig. 3.

Thereafter the power supply should be wired in accordance with the schematic diagram. Note that the high-voltage supply for the plate of the 6L6 tube V8 is taken from the mid-point of chokes L1 and L2. The remainder of the receiver is supplied from the output of choke L2. This calls for a change of the wiring on the speaker socket as it is made at the factory.

Complete the job by mounting the output transformer T1 on the frame of the speaker, wiring it to the voice coil and speaker cable. Connect the speaker plug to the free end of the cable, making sure that each lead is soldered to the proper prong. If, on first trial, the receiver oscillates, reverse connections 2 and 3 on the speaker socket, which is the same thing as reversing the voice-coil connections.

If the speaker is to be used at a remote point from the receiver, mount the output transformer T1 on the rear apron of the chassis, near the speaker socket, and wire in. In this case, only two leads need be run to the speaker, as all other connections can be made at the chassis.

The author mounted his Jensen speaker in an "infinite baffle" cabinet, the details of which are given in Fig. 4. The entire inside of the cabinet should be lined with sound-absorbing material, such as felt, Ozite, rock wool or similar material. The folded antenna is strung on stand-off insulators fastened to the rear of the cabinet.

An alternative arrangement is to obtain the Jensen MT-8 high-fidelity speaker, which

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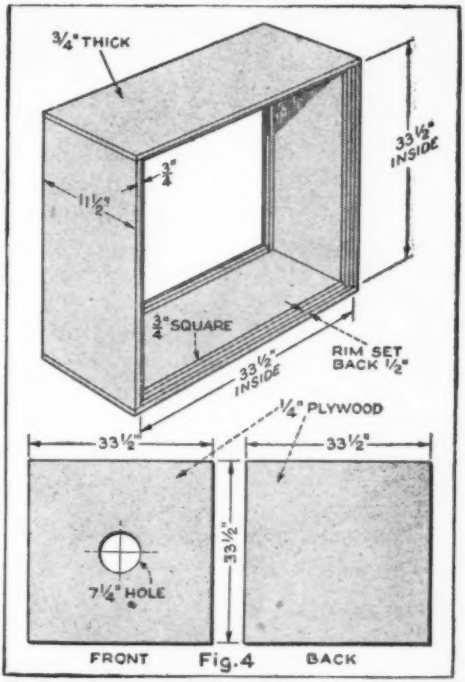


Fig. 4

Details of the "infinite baffle" speaker cabinet. If desired, a compartment can be made at the top rear for accommodating the chassis in a vertical position, with the controls out the top. This compartment should be completely enclosed except at the rear, which should be left open for ventilation.

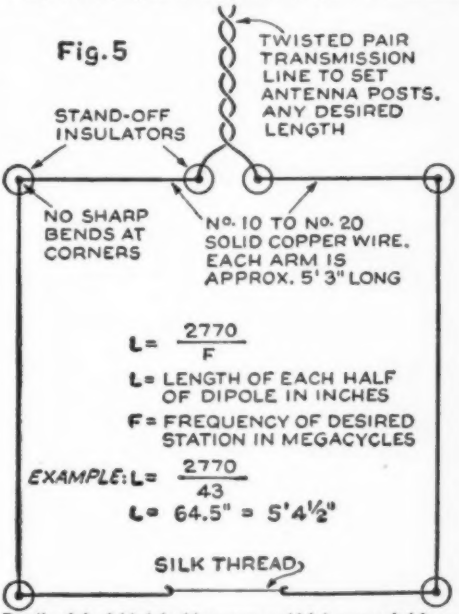
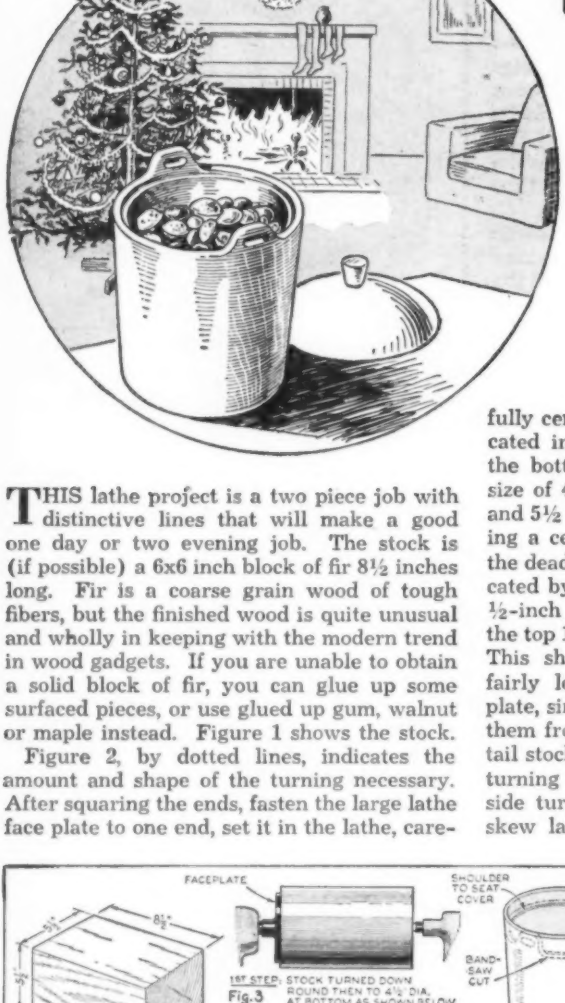


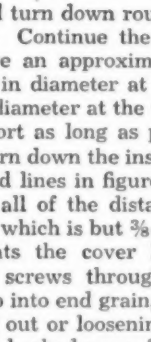
Fig. 5
TWISTED PAIR TRANSMISSION LINE TO SET ANTENNA POSTS. ANY DESIRED LENGTH
STAND-OFF INSULATORS
NO SHARP BENDS AT CORNERS
No. 10 TO No. 20 SOLID COPPER WIRE. EACH ARM IS APPROX. 5' 3" LONG
L = 2770 / F
L = LENGTH OF EACH HALF OF DIPOLE IN INCHES
F = FREQUENCY OF DESIRED STATION IN MEGACYCLES
EXAMPLE: L = 2770 / 43
L = 64.5" = 5'4½"
SILK THREAD

Details of the folded doublet antenna which is suspended from stand-off insulators. Do not make any sharp bends in the wire.



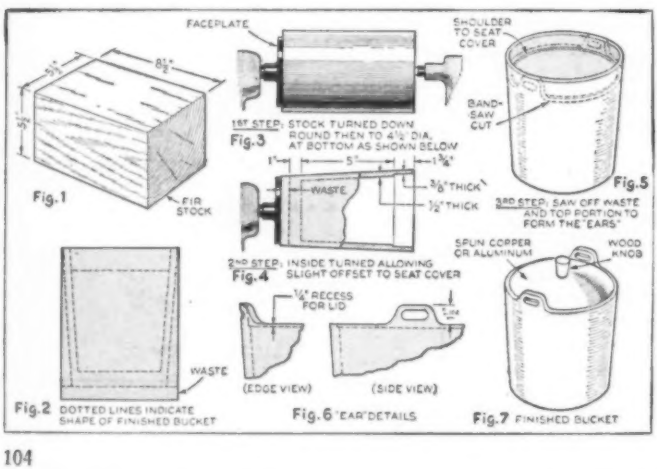
TURNED CANDY AND NUT BUCKET

by Dale Van Horn



THIS lathe project is a two piece job with distinctive lines that will make a good one day or two evening job. The stock is (if possible) a 6x6 inch block of fir 8½ inches long. Fir is a coarse grain wood of tough fibers, but the finished wood is quite unusual and wholly in keeping with the modern trend in wood gadgets. If you are unable to obtain a solid block of fir, you can glue up some surfaced pieces, or use glued up gum, walnut or maple instead. Figure 1 shows the stock.

Figure 2, by dotted lines, indicates the amount and shape of the turning necessary. After squaring the ends, fasten the large lathe face plate to one end, set it in the lathe, carefully centered, and turn down round as indicated in figure 3. Continue the turning at the bottom to give an approximate outside size of 4½ inches in diameter at the bottom and 5½ inches in diameter at the top. Leaving a center support as long as possible for the dead center, turn down the inside as indicated by the dotted lines in figure 4, leaving ½-inch walls for all of the distance except the top 1¾ inches, which is but ⅜-inch thick. This shoulder seats the cover later. Use fairly long wood screws through the face plate, since they go into end grain, to prevent them from pulling out or loosening after the tail stock has been backed away for the final turning of the inside. Proceed with the inside turning carefully, using a sharp, small skew laid flat for smoothing up the inside walls. Use the small chisel rest set partly inside the opening for the deeper turning and make the bottom flat and smooth. Sanding of the inside as the turning progresses, and afterward, is important. As for the outside, this should be slightly prolonged as the extreme softness of the wood between the hard grain may be pitted slightly from turning. Finally, with the parting chisel, cut off the waste at the bottom to remove



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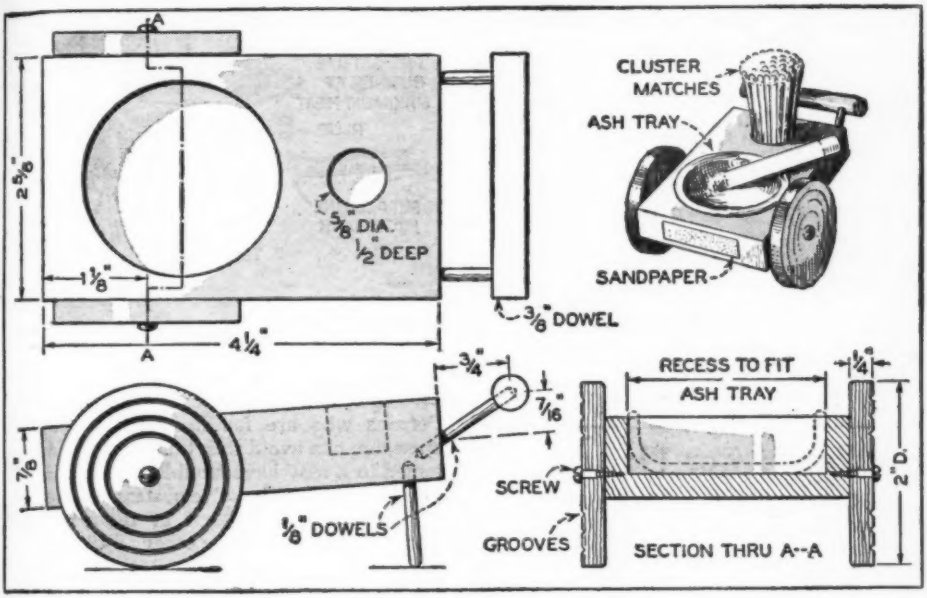
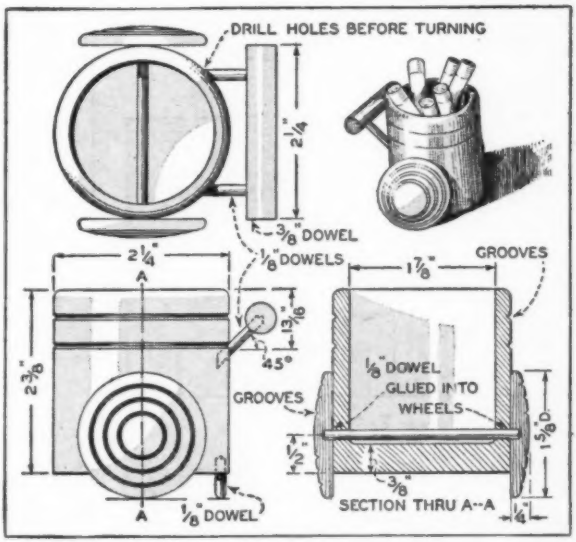
SMOKERS' ASH CARTS

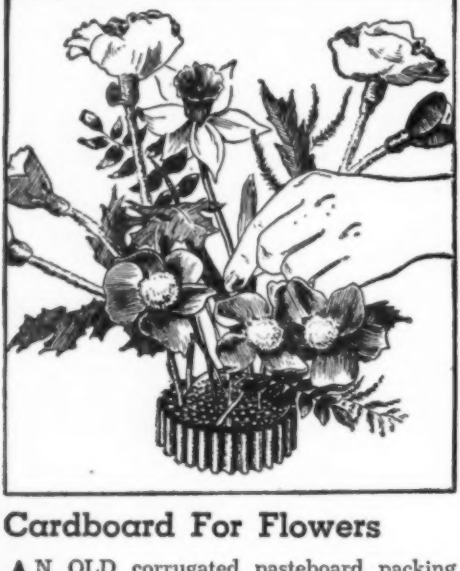


TWO carts well known to city folk are the ash cart, and the streetcleaner's cart. Converted for our purpose into miniatures, they make a cigarette ensemble that is truly different. Maple, mahogany, or walnut varnish stain makes an attractive contrast to the white of the wheel grooves, while the brightly hued match heads of the match bud add life, and invite one to light up smokes, convenient in the other cart.

To the average craftsman reader the parts present no difficulties, therefore but a few points need be described. The stock is white wood such as maple. The large hole in the body of the cart is made with an expansion bit to a size determined by the ash receptacle obtained. The 1/8" dia. pieces are cut from lolly-pop sticks, or turned; the 3/8" dia. pieces are dowel rod. Lacking a chuck, wheel grooves may be cut with the wheel held to a wood faceplate with sealing wax or glue. Also, stock for the body of the cart may be held to a faceplate with screws. A jig block for drilling the indicated holes at an angle is helpful.

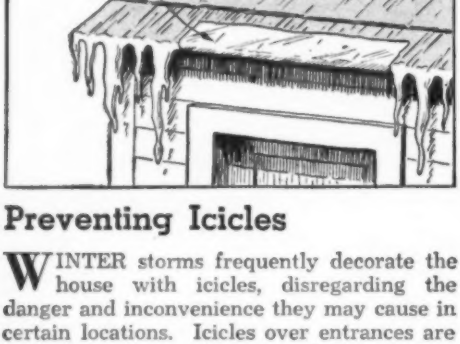


Two improvised items are the strike piece taken from a match book, and glued on, and a receptacle of glass or other material to receive ashes and stubs. A suitable one can be found in the dime store.—*Bruce MacIntosh.*



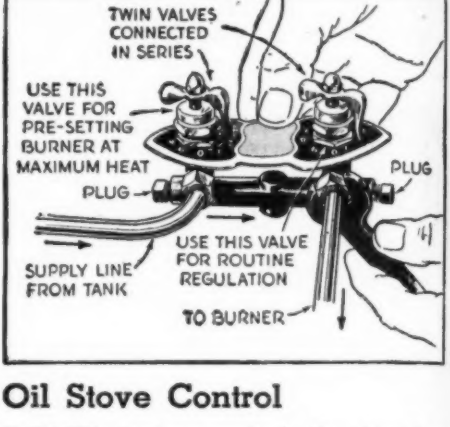
Cardboard For Flowers

AN OLD corrugated pasteboard packing box can be cut into strips to form the basic material for these simple and useful flower stands. To make the stands the strips are rolled as shown, with the flat side inward. At intervals of about one inch the strips should be coated with glue to hold the roll together. Waterproof glue must be used, of course.—*W. S.*



Preventing Icicles

WINTER storms frequently decorate the house with icicles, disregarding the danger and inconvenience they may cause in certain locations. Icicles over entrances are among the most annoying. Although they are removed with a pole or broom they form again, sometimes in a single night. By coating the surface of the roof or overhang to which they adhere, with a liberal coat of paraffine, they can be prevented.—*A. H. W.*



Oil Stove Control

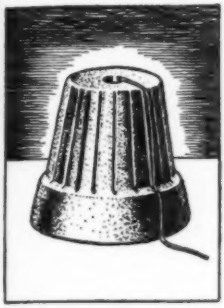
MANY oil stoves smoke badly when they are turned up above a certain point. Persons who are familiar with the stove's operation can avoid this, but those not accustomed to it may have trouble. To avoid such difficulties a double valve system can be used as shown. One is kept at the maximum smokeless opening. The other adjusts heat.—*J. M.*

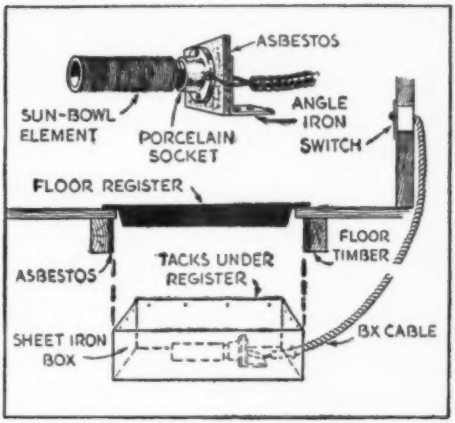
Spool For Doorknob

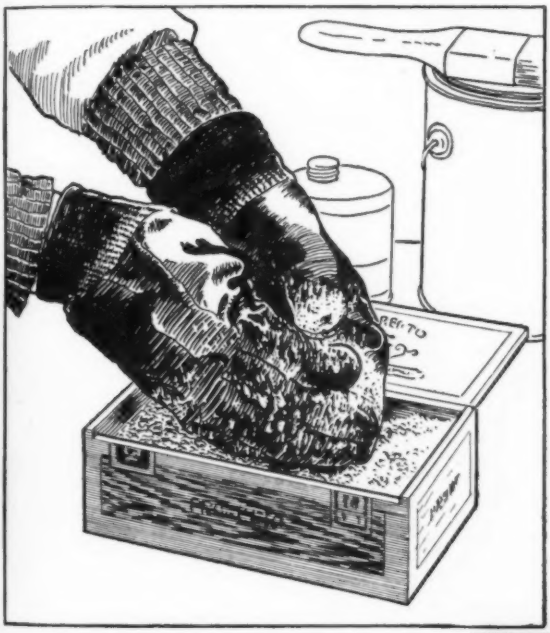
THE inconvenience often caused by the breaking of a doorknob can be avoided through the use of an old spool. The spool can be driven on to the knob shaft with a hammer or even the heel of a shoe, and will serve as a very satisfactory substitute until a new knob can be obtained. For workshops a knob of this sort is ideal.—*A. H. W.*

Twine In Flower Pot

AN ORDINARY flower pot makes an ideal holder for a ball of twine or cord. To put the flower pot to this use it is merely necessary to turn it upside down over the ball of twine, pulling the free end of the twine through the hole in the bottom of the pot. The heavier the cord, the heavier the pot should be, in order not to slide.—*A. W.*







Electric Register

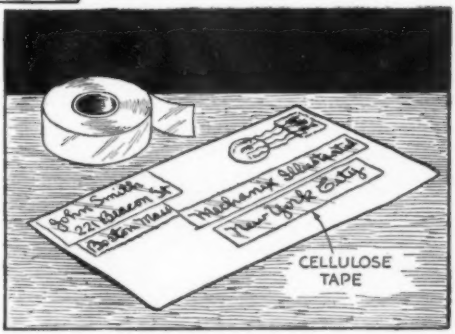
HOT air registers can be converted for electricity as shown. Units may be made removable. Use in "borderline" weather of Spring and Fall, or if the house has been converted to hot water heat as is often the case, the electric register can be a permanent installation. It aids comfort in unseasonable weather.—*L. B. R.*

Sawdust For Paint

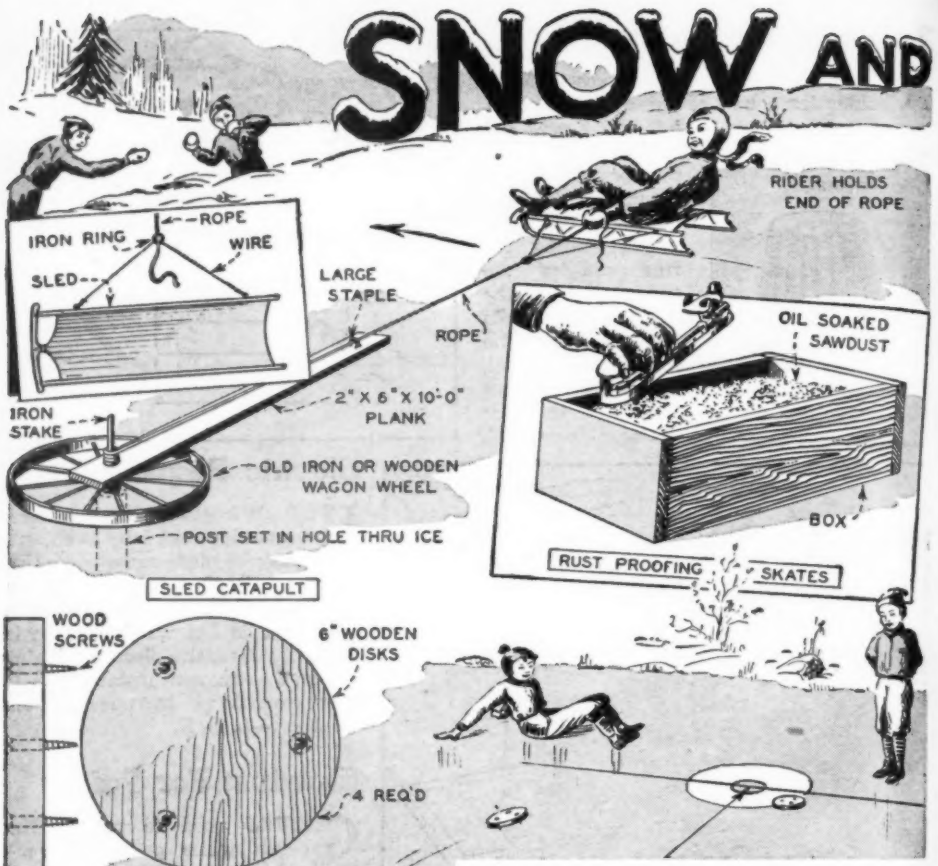
GLOVES used to protect the hands while painting, eventually become so thickly coated with the paint that they are no longer useful. To prevent this the gloves should be cleaned in a box of sawdust while they are still on the hands. This cleaning process is illustrated and consists of rubbing them vigorously in the sawdust while paint is wet.—*J. M.*

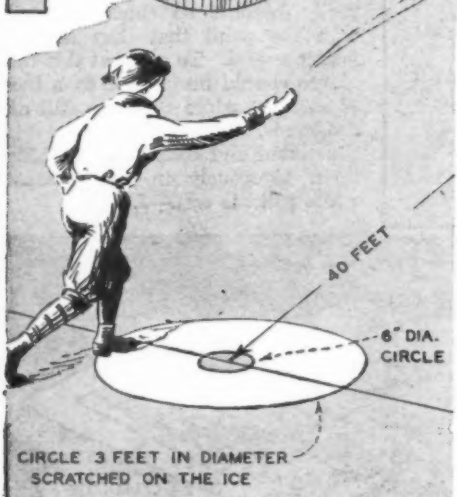
Cellulose Tape On Address

WHEN mailing an important letter in bad weather or to an outlying district where even proper care might not prevent smearing the address, transparent cellulose tape can be used as shown to cover the address. This will protect the ink at all times from rain or moisture. It will not, however, interfere in any way with the easy reading of the address. A similar principle is employed in the familiar "window" envelopes used by numerous business concerns.—*A. V.*



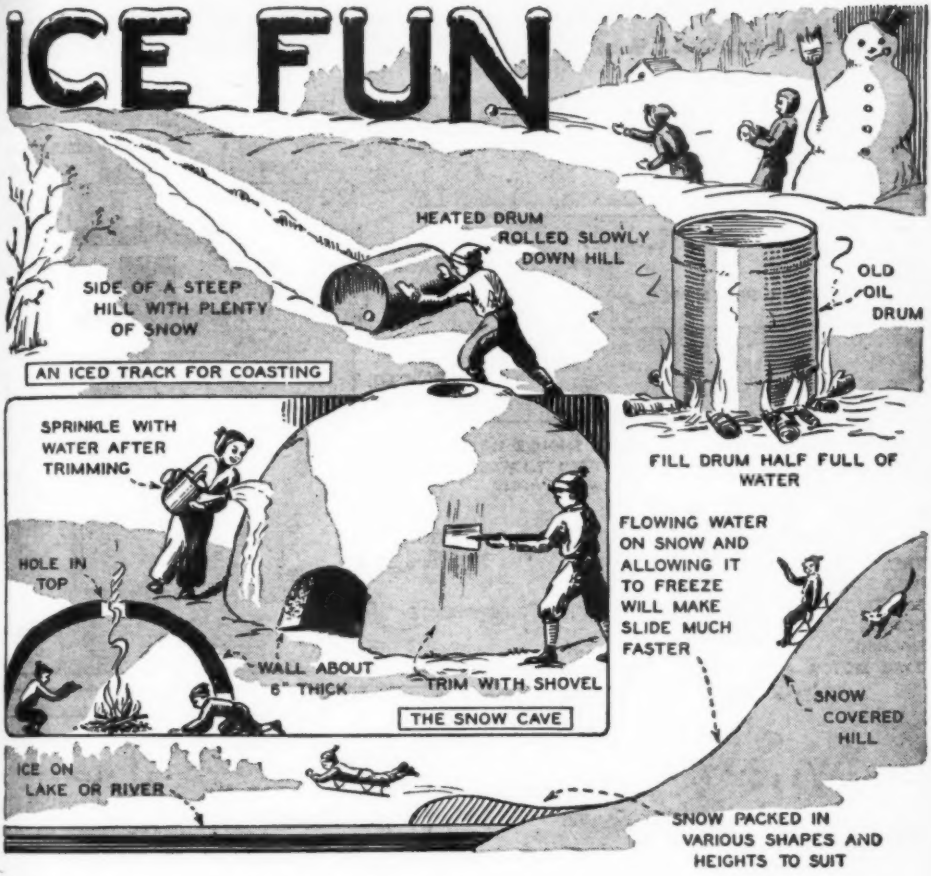
SNOW AND





DO YOU remember the things you were going to do last winter for fun on snow and ice? Here's one for a large expanse of smooth ice. It involves any sled you may happen to have, a length of small rope, a post set through the ice, with a wheel on top held in place by an iron rod driven down through the hub into the post top. There's a plank involved too. Looking at the drawing you'll see the arrangement. Set the post through the ice some distance from shore. Mount the wheel on top, with the iron stake, after being driven in, still extending well above the wheel hub. This wheel might well be one from an old corn planter. Bore a hole in a plank 6 inches wide and 10 feet long and drop it over the stake, then drive a large staple into the top near the other end. Pass a small rope through the staple and tie it to the stake—not the wheel. Fasten a piece of wire to the sled with a ring attached as indicated. Pass the rope through this, giving it

ICE FUN

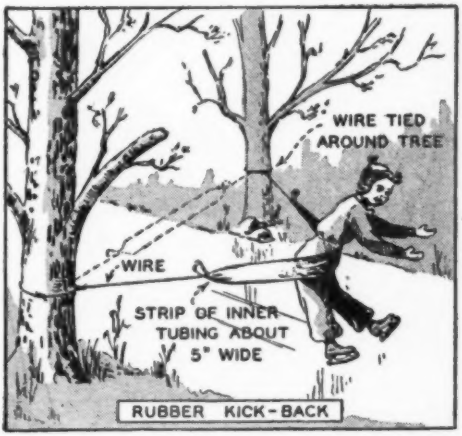

HEATED DRUM ROLLED SLOWLY DOWN HILL
SIDE OF A STEEP HILL WITH PLENTY OF SNOW
AN ICED TRACK FOR COASTING
OLD OIL DRUM
FILL DRUM HALF FULL OF WATER
SPRINKLE WITH WATER AFTER TRIMMING
HOLE IN TOP
WALL ABOUT 6" THICK
TRIM WITH SHOVEL
THE SNOW CAVE
FLOWING WATER ON SNOW AND ALLOWING IT TO FREEZE WILL MAKE SLIDE MUCH FASTER
SNOW COVERED HILL
ICE ON LAKE OR RIVER
SNOW PACKED IN VARIOUS SHAPES AND HEIGHTS TO SUIT

a couple of turns so that the sled rider, by holding the end, will keep the sled anchored to the rope until he wants to cast loose.

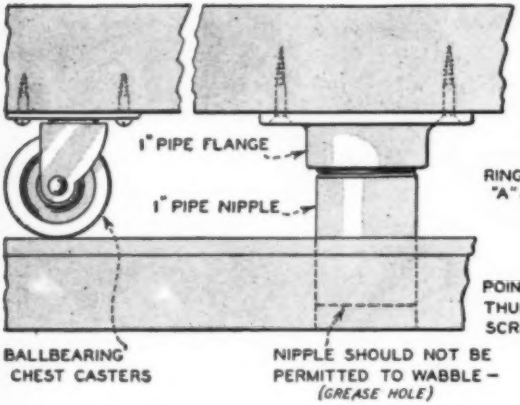
One person mounts the sled, another stands ready to push against the plank. When you start, all surplus rope must be wrapped around the stake, which brings the sled up close to the end of the plank. The operator revolves the plank and the sled coasts around in a circle just beyond it. Each revolution however, lets the sled a little farther out and as the speed increases, the circles grow in diameter and the motion becomes exhilarating, the rider finally lets go of the rope, releasing the sled which then shoots off across the ice in a straight line with surprising speed. The device, once made, will last all winter and, while packed with thrills, is safe for anyone to use.

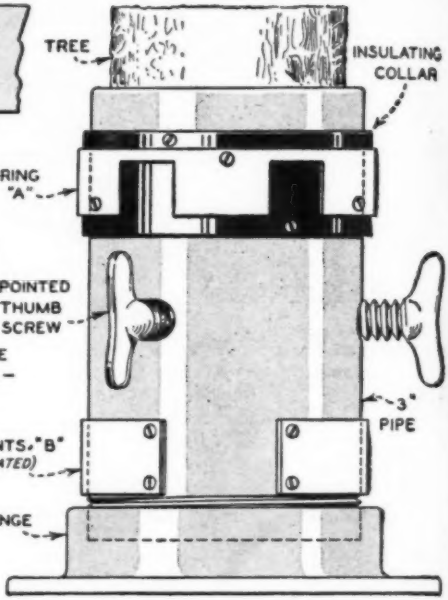
[*Continued on page* 140]

ICE-SNOW STUNT TRACK

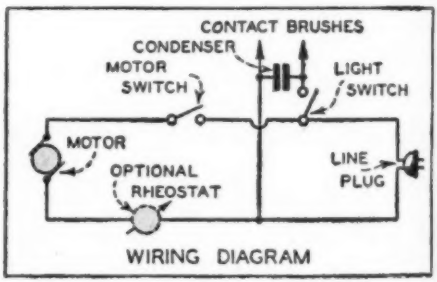


TWINKLING CHRISTMAS TREE





TREE ROTATED BY A SMALL ELECTRIC SEWING MACHINE TYPE MOTOR
TWINKLING ELECTRIC LIGHTS
DECORATED COVER OF WOOD OR SHEET METAL



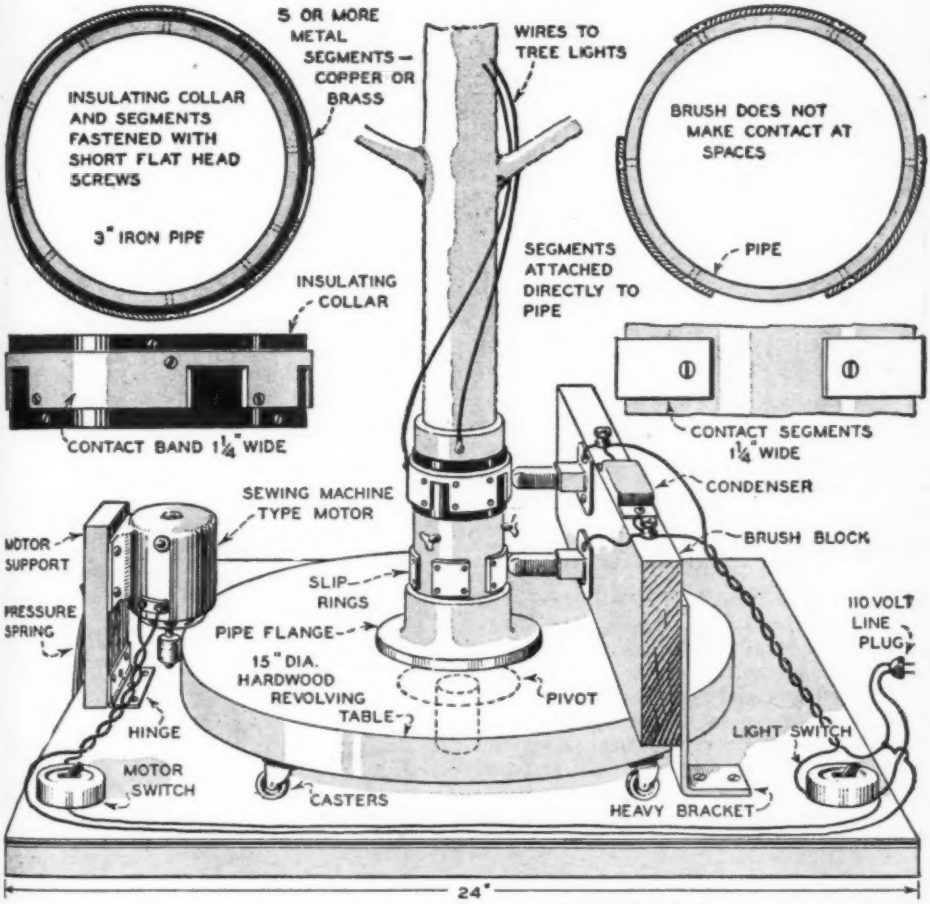
WIRING DIAGRAM

SOMETHING novel for Christmas? Something new? Well, here is something both novel and new that anyone can build. It is a method of slowly rotating the Christmas tree while all the time its many colored lights twinkle. Just a few simple pipe fittings, auto parts, a fractional horse power motor and some wood. Let's try one this year and lead the parade.

The base consists of a 24-in. square platform of heavy smooth boards, doweled or cleated together. Cover the top surface with a sheet of Masonite and wax the surface.

Next is the revolving disk. If possible cut this out with a band saw from a single hard wood plank not less than 1¼-in. thick. Scribe

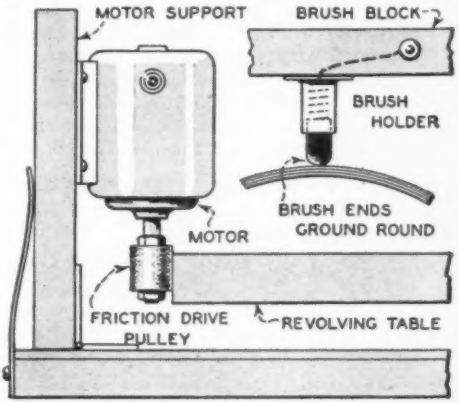
REVOLVES ELECTRICALLY



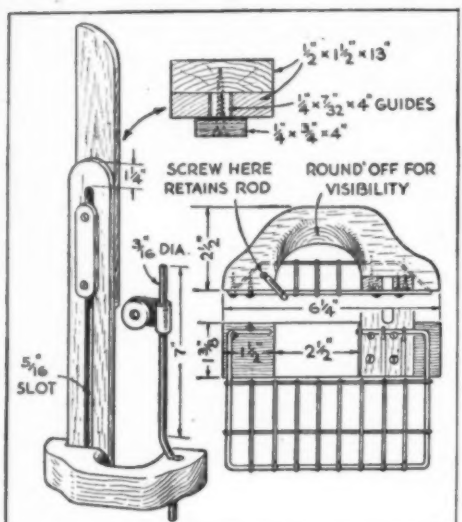
the circle with a compass and cut out carefully so the edge will present as perfect a surface as possible. Then mark out two circles; one on top and one underneath, placing them in the *exact* center. Underneath attach a 1-in. pipe flange with screws. Thread a 4-in. nipple into this as a pinion on which the disk may revolve. To the top surface of the disk attach a 3-in. pipe flange, screwing a piece of 3-in. pipe about 8 inches long into it.

Now sand off the disk edge and check with the compass to assure as perfect a circle as possible. Then, at five equidistant points around the under side of the disk and an inch from the edge fasten five ball-bearing

[*Continued on page* 154]



FOR SAFE AND HANDY

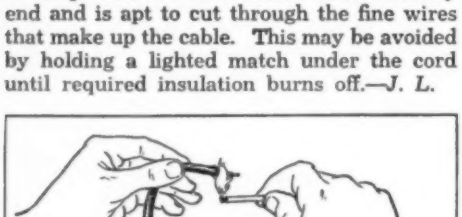


Wire Tool Rest Gauge

SELECT a foot length of rather heavy, stiff steel wire and bend it carefully as indicated. The length of the shank from the lower bend to the first upper bend depends on the tool post and rest on your lathe and may be determined by accurately setting the rest exactly on the center line. Hook the lower piece under the base of the rest and mark the shank where it contacts the upper edge. Make the first bend here. This section is about 2 inches long.—*W. C. W.*

Insulation Easily Removed

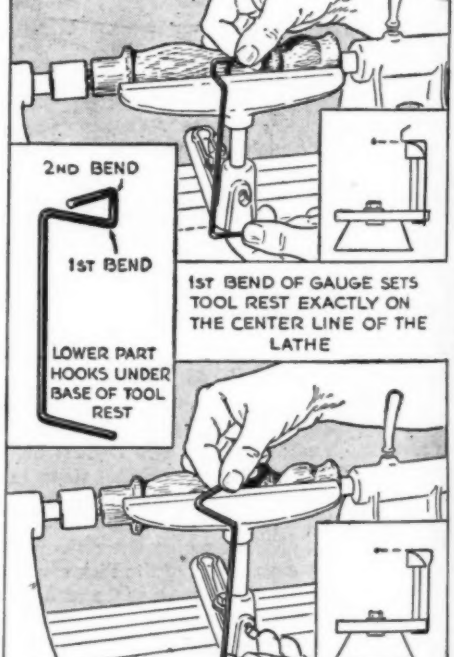
IT IS difficult to cut the insulation off a small drop-cord wire as a knife leaves a fuzzy end and is apt to cut through the fine wires that make up the cable. This may be avoided by holding a lighted match under the cord until required insulation burns off.—*J. L.*



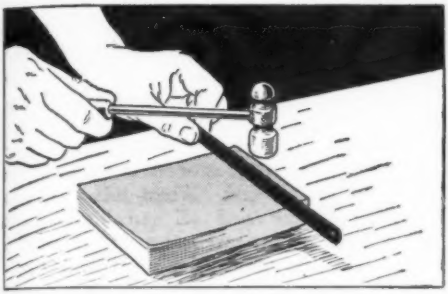
Soap Dish Band Saw Guard

THE drop-guard pictured here falls to the table as it clears the end of the board, minimizing the danger of the fingers following into the blade. The dimensions given will fit most machines, as the guard is mounted on the upper wheel cover. The guard proper is a wire soap dish mounted on a wooden yoke.

Note that the wooden slide notches into the yoke and is slitted to pass the wires of the soap dish. The latter is adapted by trimming as necessary, and is secured with round-head screws. The mounting for the wooden slide has a raised guide fitting loosely in the slide slot. It is bolted to the wheel cover with a stove bolt at the top and two near the bottom. A wire guide, bent from a small curtain rod, is mounted at the right of the yoke.—*E. L.*

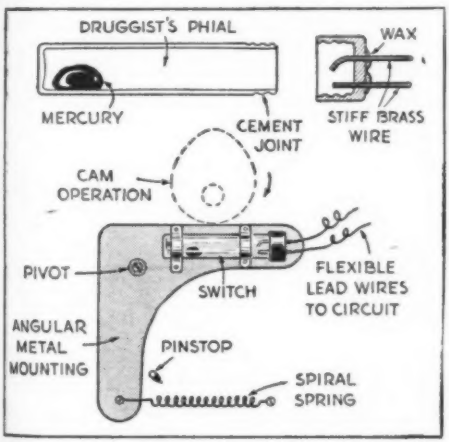

2ND BEND
1ST BEND
LOWER PART HOOKS UNDER BASE OF TOOL REST
1ST BEND OF GAUGE SETS TOOL REST EXACTLY ON THE CENTER LINE OF THE LATHE
THE SECOND BEND OF THE GAUGE DETERMINES THE USUAL SETTING OF THE REST OR 1/4" ABOVE THE CENTER LINE

HOME WORKSHOPS



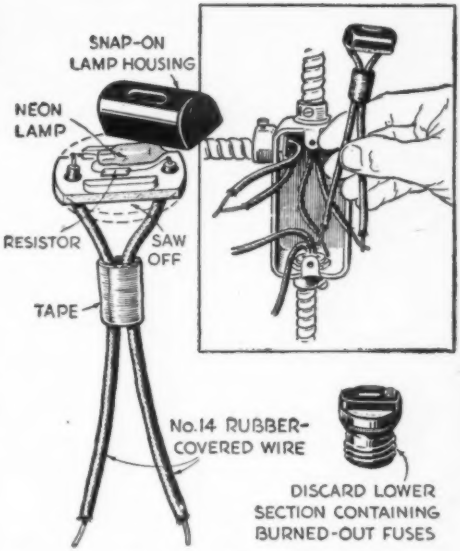
Perforating Paper Pads

IT IS often desirable to perforate a pad of paper or blanks of one kind or another so that the individual sheets may be easily and evenly removed. Although devices can be had that serve this purpose, the need for them is quite limited in the average home or shop. A hacksaw blade placed on top of the pad as shown, and hammered, does the job.—*W. S.*



Simple Mercury Switch

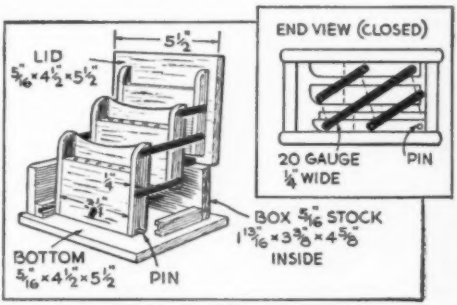
MERCURY is frequently sold in vials about 3 inches in length. This vial can easily be made into an excellent mercury switch, using a little wire and a small amount of the metal itself. The cap, usually bakelite, should be drilled to admit two stiff brass wires. All joints between wires and cap, and cap and vial, are coated with model plane cement to assure tightness and prevent leakage of mercury.—*L. B. R.*



Circuit Tester From Fuse

A SERVICEABLE circuit tester can be made from a burned-out multiple fuse of the indicating type by utilizing the neon glow-lamp it contains. Only the upper section, comprising top revolving disc, lamp and lamp housing are needed for the purpose.

[*Continued on page* 155]

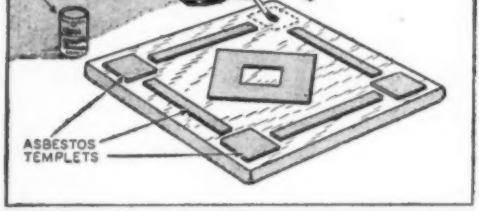


Folding Box For Drills

A HANDY spillproof drill rack can be made as shown. Iron strips of the dimensions indicated are used for arms. Holes should be drilled to hold the various sizes of drills. When the rack is open drills are accessible. Closed, they're safe.—*R. F. K.*

TWO-TONE WOODWORK

FIG. 1.
BRUSH
TEMPLETS CUT FROM ASBESTOS PAPER IN THE DESIRED DESIGNS ARE FASTENED TO THE SURFACE WITH RUBBER CEMENT
RUBBER CEMENT
ASBESTOS TEMPLETS


BLOWTORCH
FIG. 2.
A BLOWTORCH FLAME IS APPLIED LIGHTLY TO THE WOOD SURFACE PRODUCING AN ATTRACTIVE BURNT SHADE
DESIGN PROTECTED BY TEMPLETS

UNIQUE and attractive designs in burnt wood decorative effects may be quickly applied with this simple method. A glance at the accompanying illustrations will give a general idea of the entire method.

Templets cut from asbestos paper in the desired design are fastened to the surface with rubber cement. When this step has been completed and all surplus cement rubbed off, a blowtorch is passed over the wood surface as illustrated. The torch should be kept at a sufficient distance to merely singe the wood to a warm brown shade, bringing out the grain in a darker tone.

It is advisable to experiment some on a piece of scrap wood before attempting a regular project. After the burnt effect has been applied over the whole surface the asbestos templets are removed, exposing their design in the natural finish of the wood.

A colorful finishing touch is added to the finished job by painting gilt or colored strips of about a quarter-inch width around the design where the plain and the burnt surfaces converge, as shown in the illustration.

Varnish applied over the finished surface lends an attractive brilliancy to the work but where it is to blend with rustic surroundings the natural finish is most appropriate.

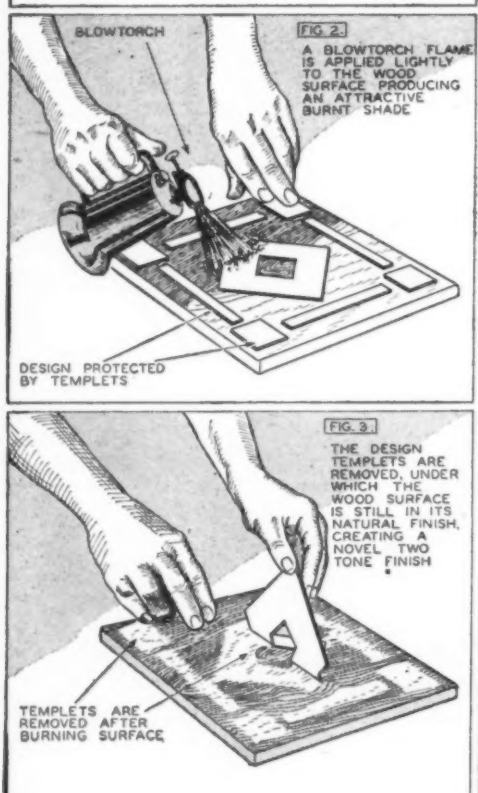


FIG. 3.
THE DESIGN TEMPLETS ARE REMOVED, UNDER WHICH THE WOOD SURFACE IS STILL IN ITS NATURAL FINISH, CREATING A NOVEL TWO TONE FINISH
TEMPLETS ARE REMOVED AFTER BURNING SURFACE

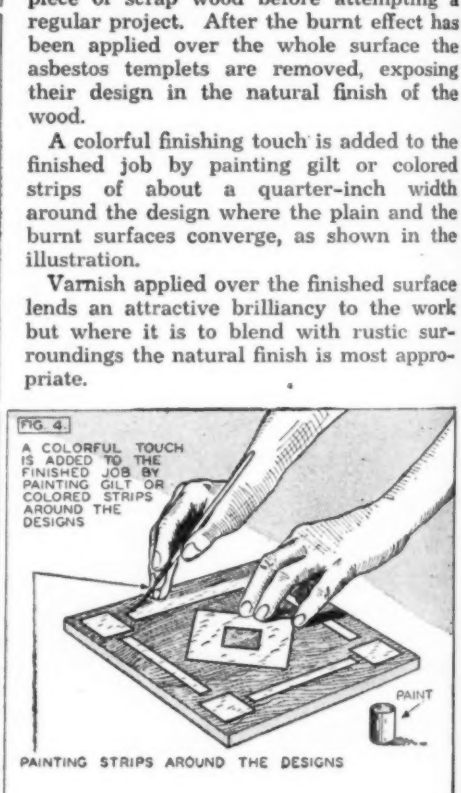


FIG. 4.
A COLORFUL TOUCH IS ADDED TO THE FINISHED JOB BY PAINTING GILT OR COLORED STRIPS AROUND THE DESIGNS
PAINT
PAINTING STRIPS AROUND THE DESIGNS

The drawings above show the separate steps in the production of the blowtorch decorations. The designs may be of geometric plan or of any other type desired by the woodworker. Borders can be added after completion.

WITH A BLOWTORCH

With a little ingenuity a great variety of novel designs may be created in this medium which has a wide field of applications on many different wood surfaces.

Monograms or initials can be easily "burned" onto the surface of wood to be used in various home workshop projects by the use of this method. With a reasonable amount of artistic talent, it is even possible to trace the outline of a sketch on the wood with a blowtorch. The procedure in this case consists of first transferring the outline from the paper on which the original is made to a piece of tracing paper. From this it is again transferred to the asbestos. After that it is a relatively simple matter to cut the asbestos to conform to the sketch.

Care should be used throughout the work in order to maintain an even tone over the entire surface of the work. If the torch is applied either too long or too close to the work, variations in the intensity of the tone produced will result. Although this is not totally unattractive, it detracts somewhat from the beauty of the finished job. After a little practice the correct technique will be a matter of "knack."

Light colored woods lend themselves most admirably to this type of decoration as a more decided contrast is produced by the scorched portions. Ideal furniture for the summer home or camp can be made in this way.—*M. G. Winterton.*

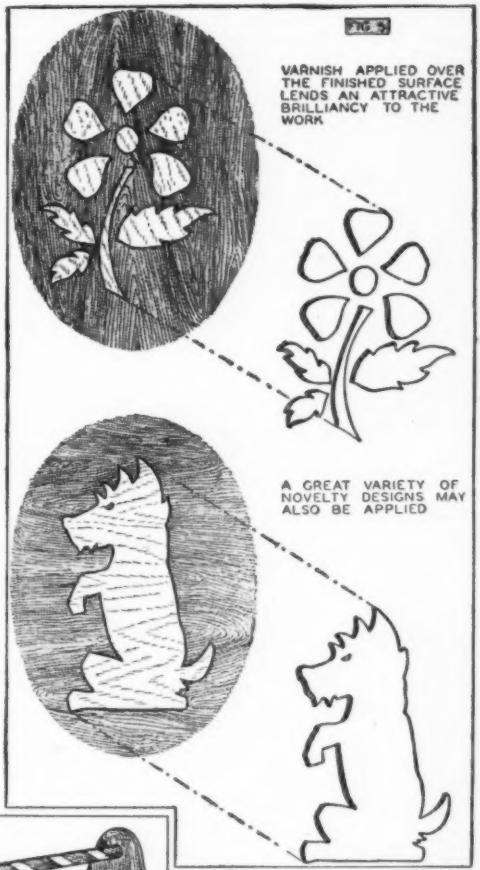
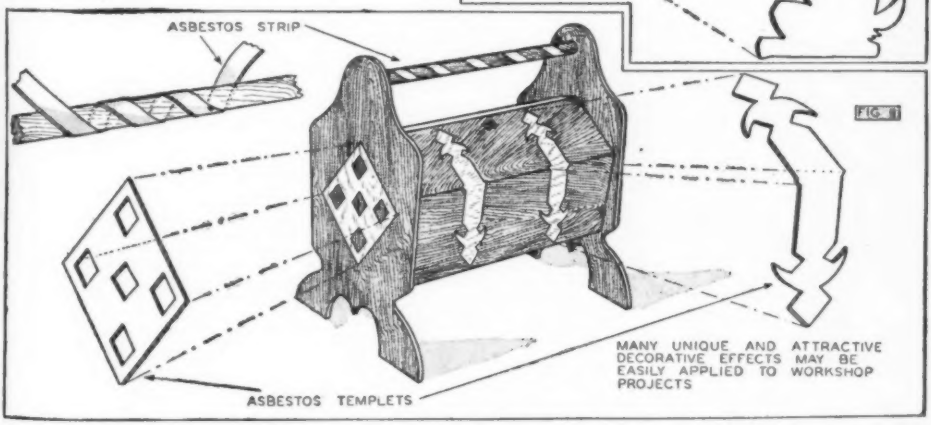


FIG. 9
VARNISH APPLIED OVER THE FINISHED SURFACE LENDS AN ATTRACTIVE BRILLIANCY TO THE WORK
A GREAT VARIETY OF NOVELTY DESIGNS MAY ALSO BE APPLIED

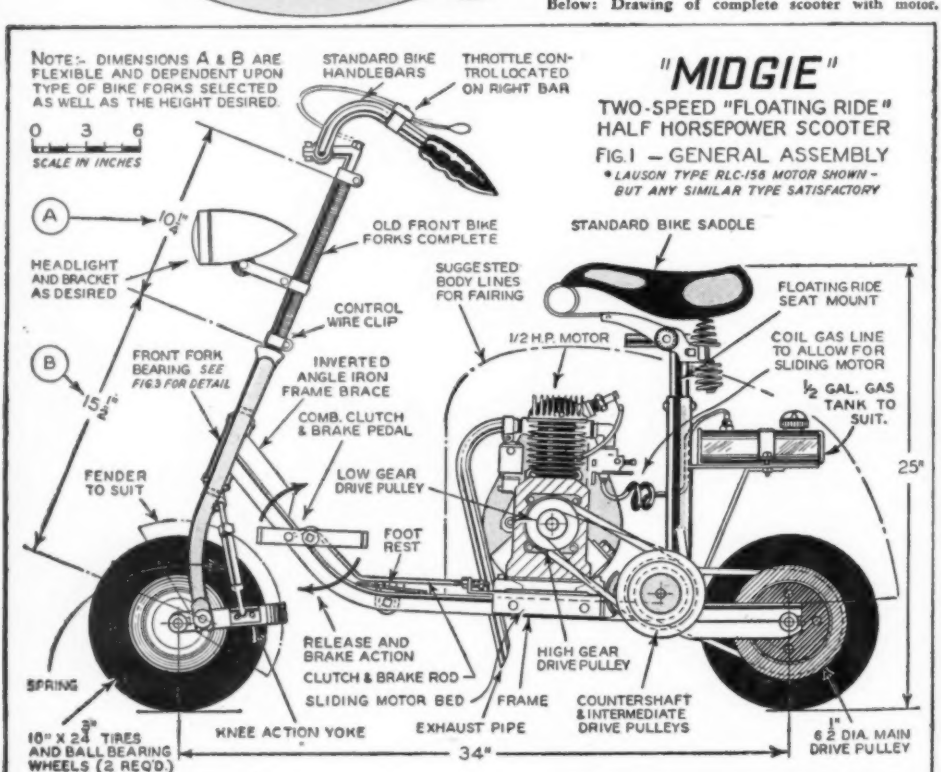

ASBESTOS STRIP
FIG. 8
MANY UNIQUE AND ATTRACTIVE DECORATIVE EFFECTS MAY BE EASILY APPLIED TO WORKSHOP PROJECTS
ASBESTOS TEMPLETS

Some of the applications of the principle of "scorch decorations" are shown above. All patterns must be cut out of sheet asbestos and cemented temporarily to the surface to be decorated, then they are taken off.

"MIDGIE"

TWO speeds, "full floating ride," combined sliding clutch and brake, and knee action are among the features of this nifty little motor scooter which costs little and is easy to build. Designed for a one-half horsepower motor this novel little scooter is easily handled by the kiddies, yet despite its small size, it can whisk any adult along with plenty of zip. Under favorable conditions speeds of up to 30 miles an hour are possible and it will run approximately 200 miles on one

Below: Drawing of complete scooter with motor.


NOTE:- DIMENSIONS A & B ARE FLEXIBLE AND DEPENDENT UPON TYPE OF BIKE FORKS SELECTED AS WELL AS THE HEIGHT DESIRED.
0 3 6
SCALE IN INCHES
"MIDGIE"
TWO-SPEED "FLOATING RIDE" HALF HORSEPOWER SCOOTER
FIG.1 — GENERAL ASSEMBLY
* LAUSON TYPE RLC-158 MOTOR SHOWN - BUT ANY SIMILAR TYPE SATISFACTORY
STANDARD BIKE HANDLEBARS
THROTTLE CONTROL LOCATED ON RIGHT BAR
STANDARD BIKE SADDLE
A
10¼"
OLD FRONT BIKE FORKS COMPLETE
HEADLIGHT AND BRACKET AS DESIRED
SUGGESTED BODY LINES FOR FAIRING
FLOATING RIDE SEAT MOUNT
CONTROL WIRE CLIP
1/2 H.P. MOTOR
COIL GAS LINE TO ALLOW FOR SLIDING MOTOR
B
15½"
FRONT FORK BEARING SEE FIG3 FOR DETAIL
INVERTED ANGLE IRON FRAME BRACE
½ GAL. GAS TANK TO SUIT.
COMB. CLUTCH & BRAKE PEDAL
25"
FENDER TO SUIT
LOW GEAR DRIVE PULLEY
FOOT REST
RELEASE AND BRAKE ACTION
CLUTCH & BRAKE ROD
HIGH GEAR DRIVE PULLEY
SPRING
SLIDING MOTOR BED
FRAME
COUNTERSHAFT & INTERMEDIATE DRIVE PULLEYS
10" X 2¼" TIRES AND BALL BEARING WHEELS (2 REQ'D.)
KNEE ACTION YOKE
EXHAUST PIPE
34"
1" 6½ DIA. MAIN DRIVE PULLEY

MOTOR SCOOTER

by Lanny Fasching

gallon of gas! If one has any old bike parts and other scrap material lying around, the total cost will not be much more than the cost of the motor and the wheels.

The first step is to secure a motor in good condition and the choice of a suitable motor is left to the builder. The motor on the original design is a Briggs & Stratton model W.M. which is well adapted to this particular scooter. The motor shown in the working drawings is a Lauson model RLC-156 which is also well suited for the purpose but probably more difficult to secure second-hand. In any event the motor must be selected before proceeding with the construction as the frame width is determined by the distance between the motor bed bolts as the cross section, Fig. 5, clearly shows. All dimensions for frame widths, pulley spacing, etc., in the drawings are for the Lauson type motor and this should be remembered when laying out and assembling the main frame members. A pair of standard 10"x2¾" wheels must also be purchased. There are many types of wheels available in this size but the Musselman Doenut wheel is recommended as excellent. This wheel has built-in ball bearings and takes a half-inch axle.

Below: Drawing showing details of transmission system and running gear of motor scooter.

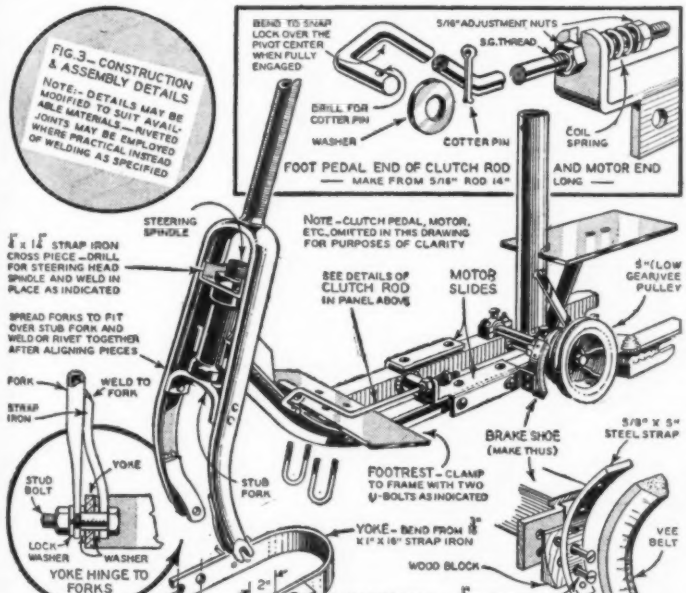
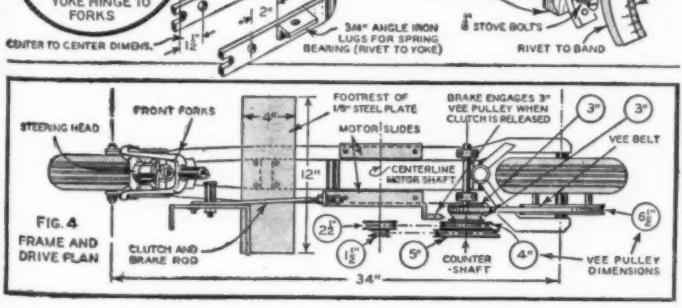
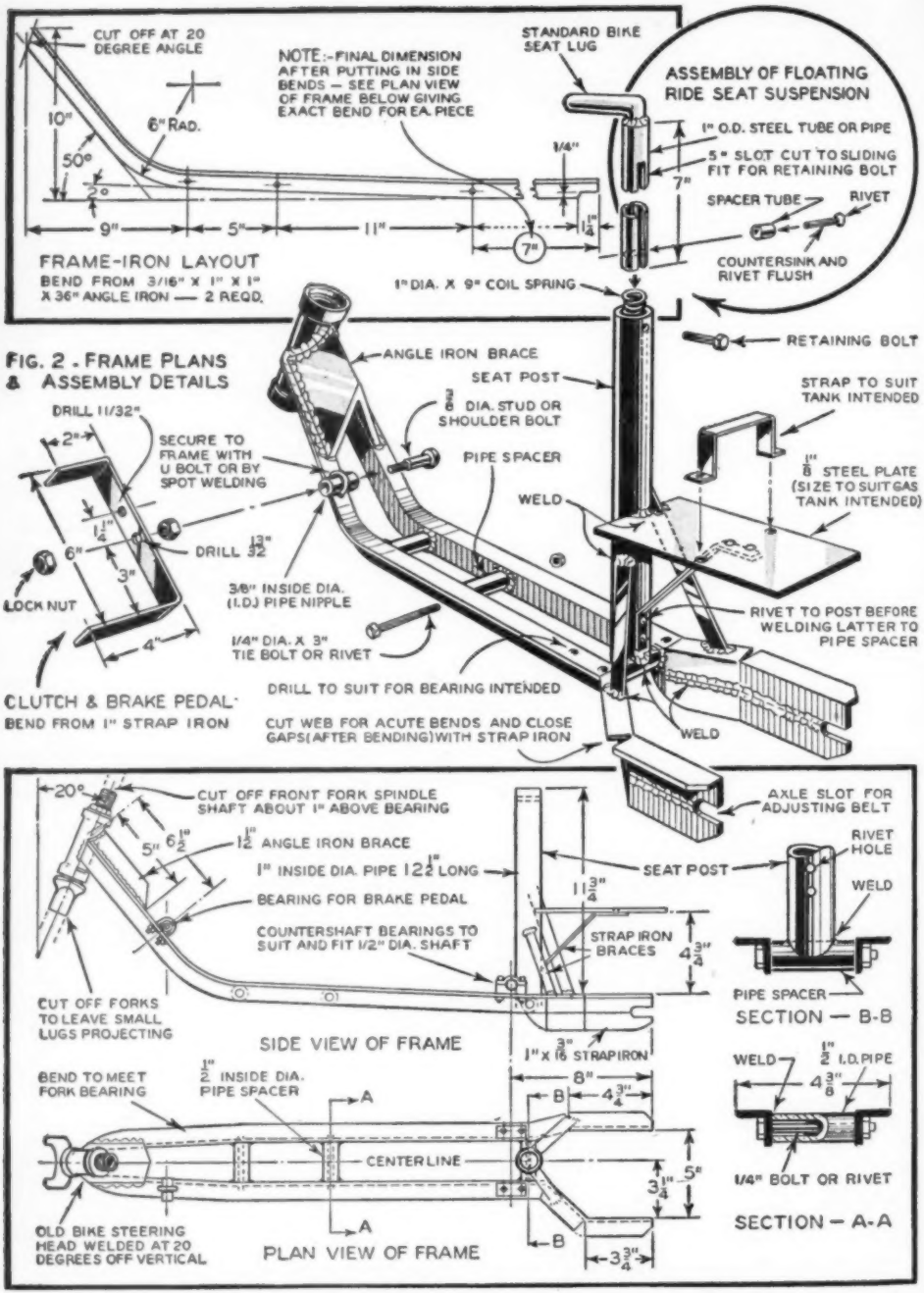


FIG. 3 — CONSTRUCTION & ASSEMBLY DETAILS
NOTE:- DETAILS MAY BE MODIFIED TO SUIT AVAILABLE MATERIALS — RIVETED JOINTS MAY BE EMPLOYED WHERE PRACTICAL INSTEAD OF WELDING AS SPECIFIED
BEND TO SNAP LOCK OVER THE PIVOT CENTER WHEN FULLY ENGAGED
5/16" ADJUSTMENT NUTS
S.G. THREAD
DRILL FOR COTTER PIN
WASHER
COTTER PIN
COIL SPRING
FOOT PEDAL END OF CLUTCH ROD — MAKE FROM 5/16" ROD 14" — AND MOTOR END LONG
STEERING SPINDLE
NOTE - CLUTCH PEDAL, MOTOR, ETC., OMITTED IN THIS DRAWING FOR PURPOSES OF CLARITY
STRAP IRON CROSS PIECE - DRILL FOR STEERING HEAD SPINDLE AND WELD IN PLACE AS INDICATED
SEE DETAILS OF CLUTCH ROD IN PANEL ABOVE
MOTOR SLIDES
SPREAD FORKS TO FIT OVER STUB FORK AND WELD OR RIVET TOGETHER AFTER ALIGNING PIECES
FORK
WELD TO FORK
STRAP IRON
YOKE
STUB BOLT
LOCK WASHER
WASHER
YOKE HINGE TO FORKS
STUB FORK
BRAKE SHOE (MAKE THUS)
STEEL STRAP
FOOTREST - CLAMP TO FRAME WITH TWO U-BOLTS AS INDICATED
YOKE - BEND FROM 8" X 1" X 16" STRAP IRON
VEE BELT
WOOD BLOCK
STOVE BOLTS
RIVET TO BAND
CENTER TO CENTER DIMENS.
3/16" ANGLE IRON LUGS FOR SPRING BEARING (RIVET TO YOKE)



Having obtained a motor and wheels the next step is to obtain two old bike forks complete and the steering head from an old bike frame. About 7' of $\frac{3}{16}$"x1"x1" angle iron is needed for the frame as well as a short length of 1½" angle iron, a 12" piece of ½" pipe and about 3' of $\frac{3}{16}$" strap iron 1" wide. The seat pillar requires a 13" length of 1" pipe. Pipe sizes are always given by the inside diameter and this fact should be kept in mind when ordering your materials. The remainder of the material needed consists of six pulleys, a few feet of vee belting, one old bike saddle and miscellaneous bolts and nuts—all of which can be found in the drawings.

Build the frame first as shown in the plans and detailed drawings, Fig. 2. Welding can be



The drawing above shows the details of the welded frame. Note the simplicity and ruggedness of the construction and design. Some of the joints shown welded could be made with rivets or bolts but a considerable loss of rigidity would result. The most economical practical combination of these methods is already embodied in the plans. Follow instructions carefully.

eliminated to some extent by exercising a little ingenuity but all in all a welded joint is just as simple and far stronger than riveted or bolted unions. If you lack equipment or the necessary experience there is usually a welding plant in your local garage where the work can be quickly completed. In bending the frame behind the countershaft bearings where it spreads out to form the rear forks it will be necessary to cut the web plate as shown. These cuts can be filled in or covered with strap iron welded on to retain strength.

The steering head from an old bike frame is welded in at the correct angle as shown in the assembly detail (Fig. 2) and braced to the frame with a piece of 1½" angle iron inverted and cut to fit. As already mentioned the exact width of the frame is determined by the motor available. It should be just wide enough to permit the motor bed irons an easy sliding fit.

Details of the front wheel suspension are clearly shown in Fig. 3 as well as the details of the combination clutch and brake rod, the footrest plate and position of the countershaft bearings. The countershaft bearings can be almost anything, but ball bearings, if obtainable, are preferred. Plain bearings may be employed but should be equipped with grease fittings and lubricated frequently. The countershaft should be placed as shown—just clearing the seat pillar. The knee action springs on the original job are merely hood clamps from a 1930 Chevrolet. It will be necessary to weld or bolt small lugs on to the forks to provide anchorage for these springs. Details of the floating ride seat suspension are shown in the drawings. Force

[*Continued on page* 162]

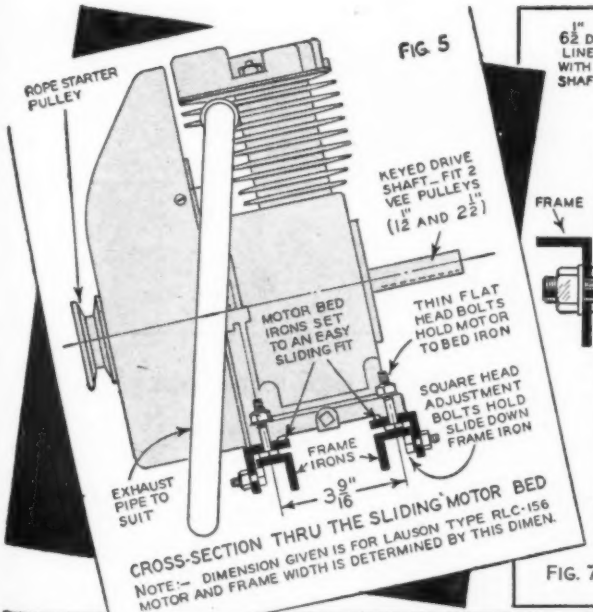
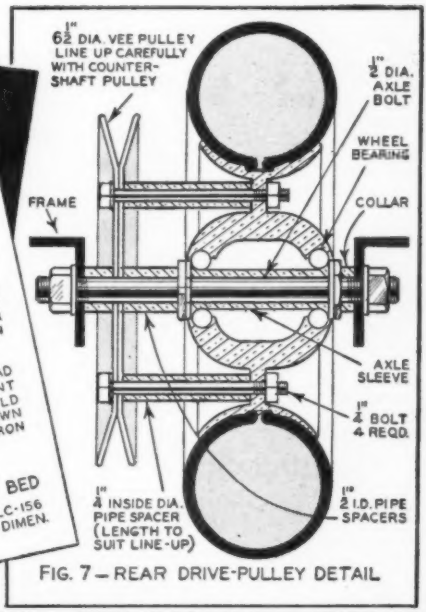
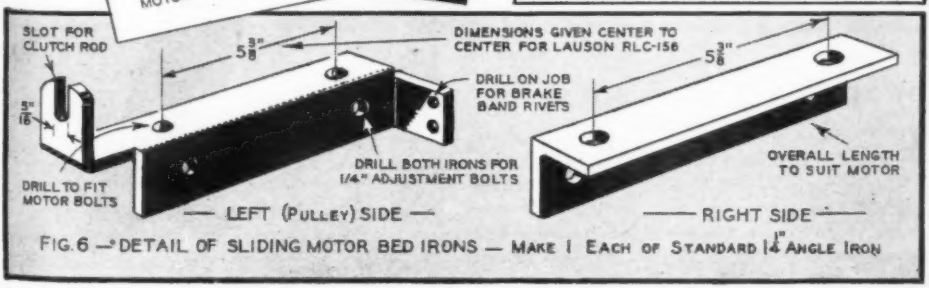


FIG. 5
ROPE STARTER PULLEY
KEYED DRIVE SHAFT—FIT 2 VEE PULLEYS 1" (12 AND 22½)
MOTOR BED IRONS SET TO AN EASY SLIDING FIT
THIN FLAT HEAD BOLTS HOLD MOTOR TO BED IRON
SQUARE HEAD ADJUSTMENT BOLTS HOLD SLIDE DOWN FRAME IRON
FRAME IRONS
EXHAUST PIPE TO SUIT
3 9/16"
CROSS-SECTION THRU THE SLIDING MOTOR BED
NOTE:— DIMENSION GIVEN IS FOR LAUSON TYPE RLC-156 MOTOR AND FRAME WIDTH IS DETERMINED BY THIS DIMEN.

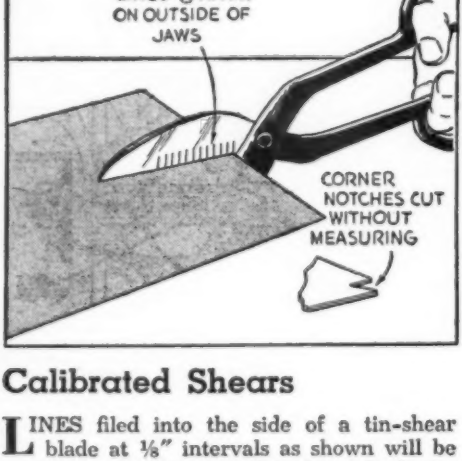

6½" DIA. VEE PULLEY LINE UP CAREFULLY WITH COUNTER-SHAFT PULLEY
½" DIA. AXLE BOLT
WHEEL BEARING
FRAME
COLLAR
AXLE SLEEVE
¼" BOLT 4 REQD.
¼" INSIDE DIA. PIPE SPACER (LENGTH TO SUIT LINE-UP)
½" I.D. PIPE SPACERS
FIG. 7—REAR DRIVE-PULLEY DETAIL


SLOT FOR CLUTCH ROD
5 3/8"
DIMENSIONS GIVEN CENTER TO CENTER FOR LAUSON RLC-156
DRILL ON JOB FOR BRAKE BAND RIVETS
5/16"
DRILL TO FIT MOTOR BOLTS
DRILL BOTH IRONS FOR 1/4" ADJUSTMENT BOLTS
OVERALL LENGTH TO SUIT MOTOR
LEFT (PULLEY) SIDE
RIGHT SIDE
FIG. 6—DETAIL OF SLIDING MOTOR BED IRONS — MAKE 1 EACH OF STANDARD 1¼" ANGLE IRON

Shelf For Scroll Saw

A SHELF atop a scroll saw is a great convenience on small work. It can easily be made as shown, the short legs being made to fit snugly against the rigid arm of the machine. The shelf is removable.—*E. M. L.*

Novel Ideas



Calibrated Shears

LINES filed into the side of a tin-shear blade at ⅛" intervals as shown will be a great aid when notching metal sheets. Longer lines may be filed for the ½" marks. Much time is saved in this way as work can be cut and measured simultaneously.—*A. H. W.*

Strap Hinge Easels

IT IS sometimes desirable to place a picture on a table instead of hanging it on the wall. If the frame is of the wall hanging type some difficulty will be found in devising a way to make it stand up. Ordinary strap hinges can solve the problem as illustrated.—*A. H. W.*

Beer Opener Tool

A BEER can opener of the type often given free with the cans, makes an efficient tack lifter. It should be filed as indicated in the drawing above.—*L. B. R.*

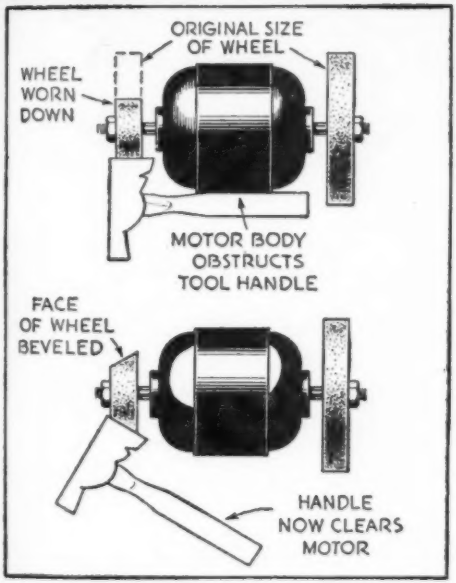
for Home Shop Work

Sand Disk Substitutes

WHEN a sanding disk wears out or tears at an inconvenient time, a substitute can easily be made from strips of garnet paper joined with gummed tape. If such tape is not available strips of glue-coated paper will do.—*E. M. L.*

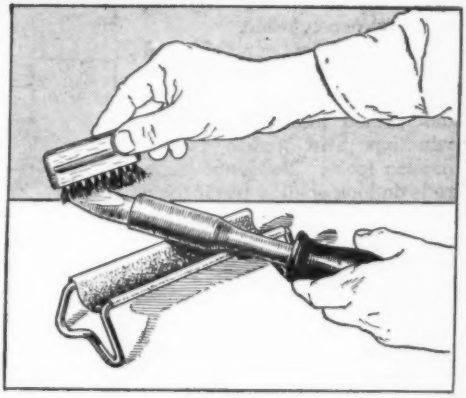
Wire Brush Cleans Iron

A SMALL brass wire brush such as used to clean suede shoes is a handy soldering iron cleaner. It may be used while the iron is hot without damaging either the iron or the brush. The advantage of this type of cleaning tool is the fact that it imposes practically no wear on the soldering iron itself.—*E. L. B.*



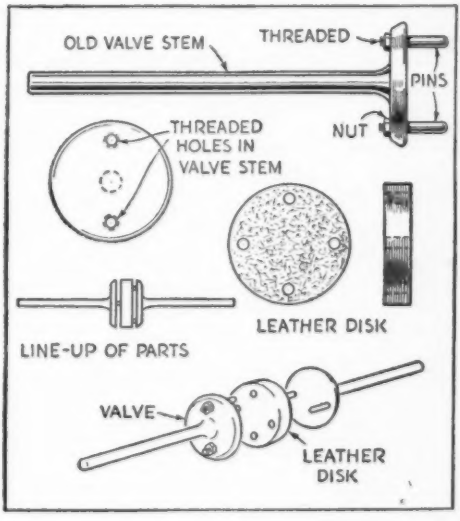
Beveled Grinder Wheel

WHEN a grinder wheel becomes worn as shown, the bevel indicated will greatly increase its usefulness. Motor will then not obstruct the work.—*A. V.*



Low Power Universal

UNIVERSAL joints for light machinery can be made from old auto valves. The valves should be annealed before drilling and tapping for the pins. A heavy leather disk acts as intermediate connection.—*L. B. R.*

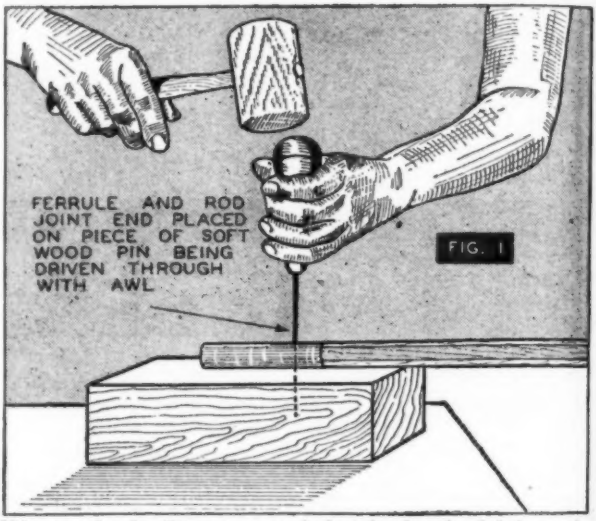


Reconditioning

Many an old fishing rod has years of satisfactory service left in it. Here are the best methods of reclaiming those long discarded rods from the attic or store room and making them serve the angler again.

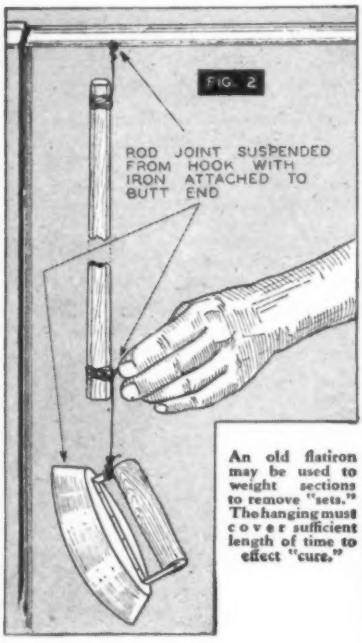
TO AN ardent fisherman his rod is by far his most cherished possession. It is a valued friend well worth the small consideration it takes to keep it in perfect condition. And the angler who carelessly neglects the few minor attentions and repairs which are so often needed will discover that his hobby of sport fishing can be an expensive one.

Some anglers cram their rod joints into the nearest junk box merely because the varnish has peeled and some of the windings and guides have broken loose. No doubt these rods do look shabby but if their owners stop to consider that the damage is of little consequence to the rods and could be very easily repaired, they would not have discarded them.

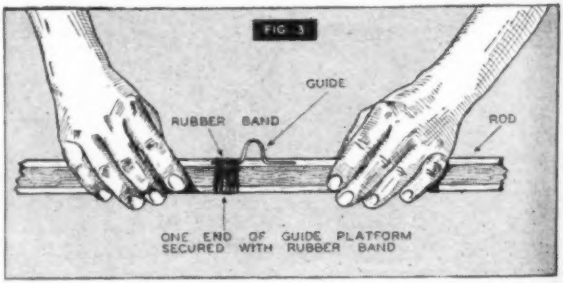


Using an awl and mallet to remove a pin from ferrule and rod during repair.

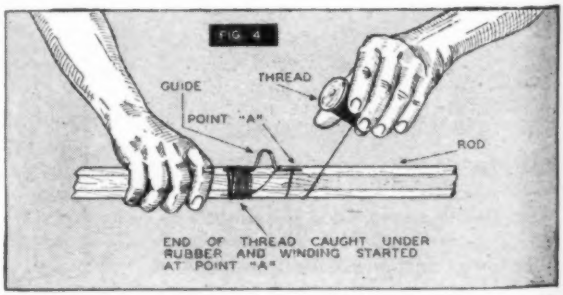
The trouble with the average angler is that once he has finished with his day's fishing, he hurriedly and carelessly packs together



An old flatiron may be used to weight sections to remove "sets." The hanging must cover sufficient length of time to effect "cure."

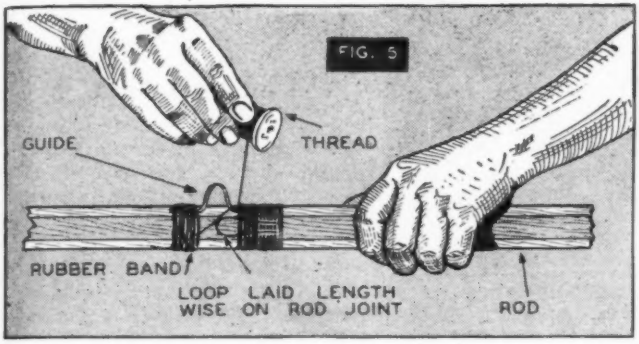


Above and below are shown successive steps in the correct way of rod winding.

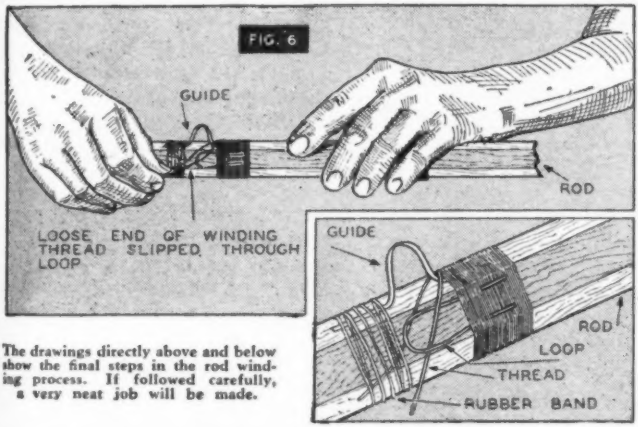


the Fishing Rod

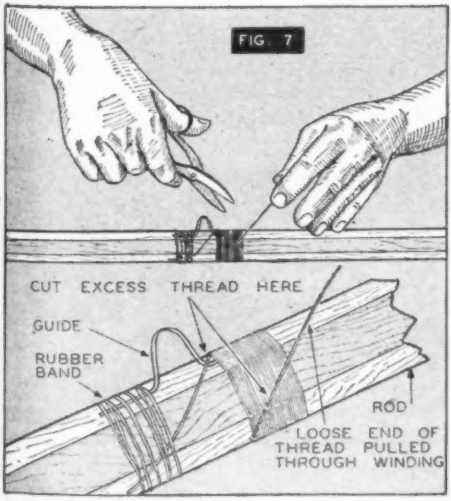
by
Ben Trask



The drawing at the left illustrates the position of the lengthwise loop for concealing thread ends.



The drawings directly above and below show the final steps in the rod winding process. If followed carefully, a very neat job will be made.



his damp tackle and makes tracks for home, there to deposit his paraphernalia in a convenient closet until the advent of another fishing trip. This procedure is the surest method of ruining good equipment, especially a fine fishing rod. Many have experienced the disappointment of finding run down rods just at the time they anticipated a week-end of good sport.

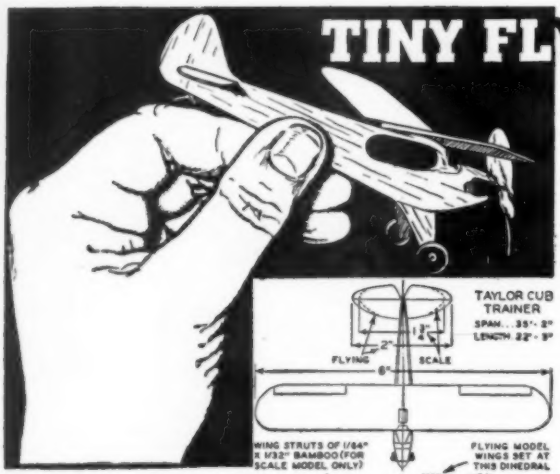
At the end of a fishing day a rod should not only be wiped dry with a soft cloth, but it should also be rubbed down with a lightly oiled rag, before putting it into its case. Upon arriving home the rod should be put together and carefully hung on a hook in a cool, dry place, until it is needed again. Rods should never be kept for any length of time in stuffy cloth or air-tight metal cases. These containers are not practical for permanent storage places and should be utilized for transportation purposes only.

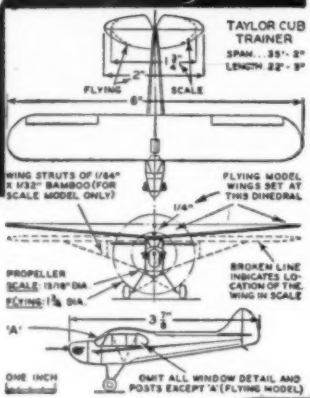
Let us assume that we have a fly-rod, although the following may be applied to any type of fishing rod which is in a run down condition with windings broken, blistered and chipped varnish and loose ferrules and guides. By no means cast it aside as a hopeless case. In all probability the rod hasn't spent one-tenth of its lifetime. By following these few simple instructions you could no doubt recondition the rod as good as new.

The rod joints will have to first be stripped and cleaned down to the raw bamboo. All of the windings, guides, ferrules, and old varnish must be removed. The silk windings can be easily peeled off after first cutting them with a razor blade. If the snake guides are badly rusted they should be discarded and replaced

[*Continued on page* 157]

TINY FLYING MODELS



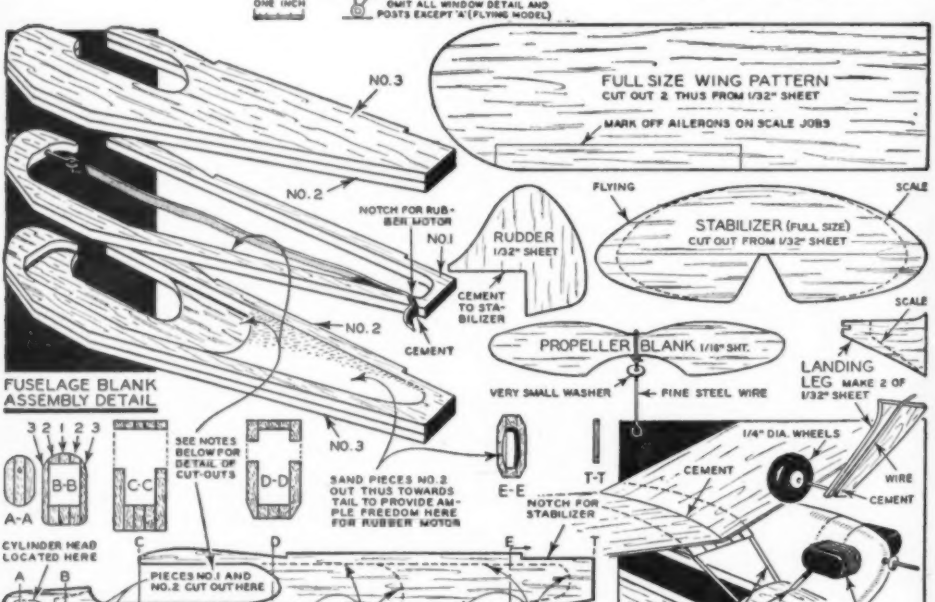

TAYLOR CUB TRAINER
SPAN... 35"- 3"
LENGTH 22"- 9"
FLYING
SCALE
WING STRUTS OF 1/64" X 1/32" BAMBOO (FOR SCALE MODEL ONLY)
FLYING MODEL WINGS SET AT THIS DIHEDRAL
PROPELLER
SCALE: 13/16" DIA.
FLYING: 1" DIA.
BROKEN LINE INDICATES LOCATION OF THE WING IN SCALE
'A'
ONE INCH
OMIT ALL WINDOW DETAIL AND POSTS EXCEPT 'A' (FLYING MODEL)

The sketches above and at right illustrate the dimensions of these ant-sized planes. They can be designed to really fly or merely to include complete detail.

BUILDING diminutive scale models of airplanes is a fascinating hobby and a real test of one's skill and patience. By using the 3-view line plans which regularly appear in trade aviation papers and enlarging them three times you will have a working basis for accurate models ranging from six inches upwards in span depending upon the type you elect to build. A whole fleet of these tiny craft will take up little room and form a valuable collection for aviation enthusiasts. The models may be built as flying models or strictly scale.

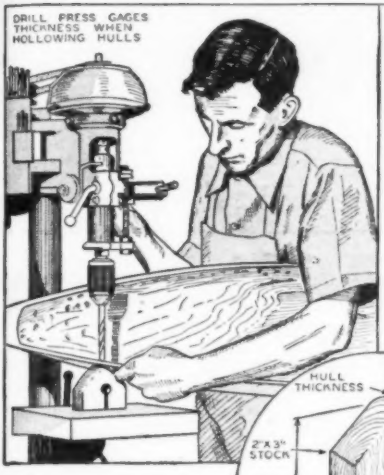
The model illustrated and selected as a simple type for beginners is the well-known Taylor Cub, a light two-place monoplane which is to be seen in practically every community here and abroad.

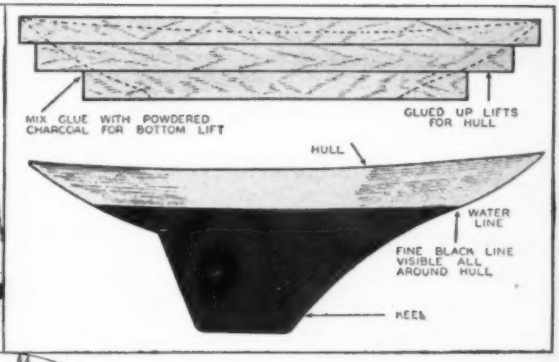
[*Continued on page* 156]

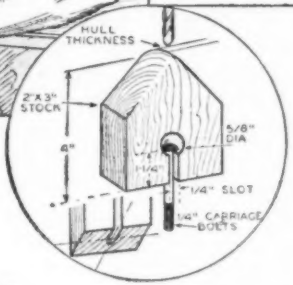


FULL-SIZE PATTERNS OF FUSELAGE IN PROFILE & CROSS-SECTION

The drawing above is that of a Taylor Cub. Any plane may be made from illustrations in aviation periodicals.




MIX GLUE WITH POWDERED CHARCOAL FOR BOTTOM LIFT
GLUED UP LIFTS FOR HULL
HULL
WATER LINE
FINE BLACK LINE VISIBLE ALL AROUND HULL
KEEL



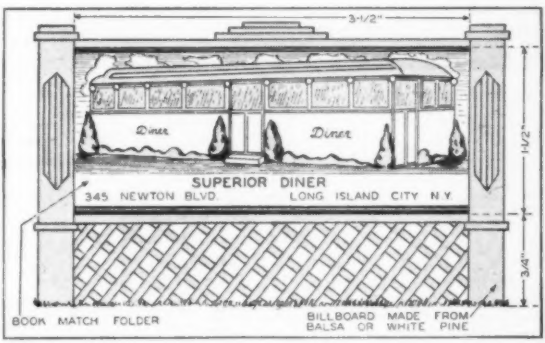
The plunger on the drill press must be carefully marked unless it is calibrated. Otherwise the drill might be run too far down.

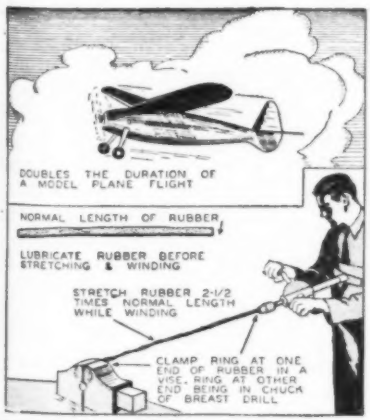
Model Boat Building Kinks

MODEL boat builders who build their models in layers or "lifts" will appreciate the above aid. When gluing the bottom lift in place, mix finely powdered charcoal with the glue. When the hull is sanded down a black line will then show up as a guide for a straight water line. By gauging and marking the drill press plunger, a pointed block may be used as shown to thin out sides.—*H. R. W. & E. M. L.*

Match Covers Make Model Signs

ORDINARY match pack covers can be mounted as illustrated at the right to make model billboards. As the pictures and reading matter on the match covers are of a typical advertising nature, the covers need only be cut and mounted on wooden frames.—*U. H.*

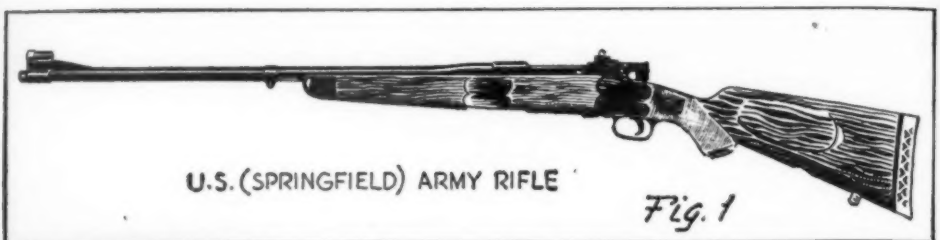



DOUBLES THE DURATION OF A MODEL PLANE FLIGHT
NORMAL LENGTH OF RUBBER
LUBRICATE RUBBER BEFORE STRETCHING & WINDING
STRETCH RUBBER 2-1/2 TIMES NORMAL LENGTH WHILE WINDING
CLAMP RING AT ONE END OF RUBBER IN A VISE, RING AT OTHER END BEING IN CHUCK OF BREAST DRILL

"Supercharged" Aero Rubber

MODEL airplane rubber can be made to give superior performance by lubricating it and stretching it to 2½ times its length when winding. Ready made lubricants are obtainable if desired, but mixtures of glycerine and green soap are freqently used. A regular breast drill may be used for winding, providing hooks are firmly clamped.—*L. J. M.*

Hints for Model Makers



U.S. (SPRINGFIELD) ARMY RIFLE

Fig. 1

The drawing above shows what can be done with a standard make of gun. Patient and careful workmanship shows.

Forend Tips on

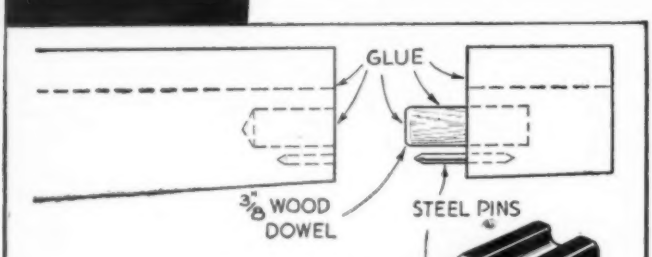


Fig. 2

Above: One method of fastening the forend tip in place on the rifle.

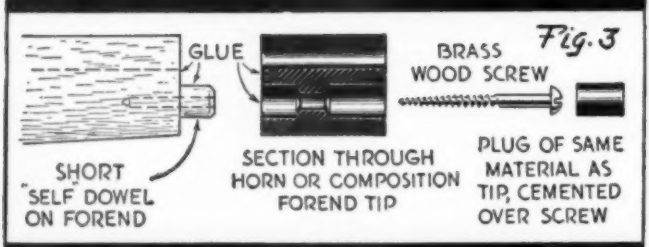

GLUE
BRASS WOOD SCREW
SHORT "SELF" DOWEL ON FOREND
SECTION THROUGH HORN OR COMPOSITION FOREND TIP
PLUG OF SAME MATERIAL AS TIP, CEMENTED OVER SCREW

Fig. 3

Above: This method of fastening is one of the most reliable and neat.

THE modern rifle or shotgun stock is a thing of real beauty, streamlined in design and usually made of finely figured and beautifully checked and finished French, Circassian or American walnut. The "little things" count here even more than elsewhere.

The tip of a forend, though useless, nevertheless plays an important part in the modern stock.

It may be made of any dark colored, dense, close-grained wood, such as ebony or lignum vitae. A light colored wood like holly or satinwood will contrast nicely with a darker colored stock. It may also be made of boxwood, or ivory, or any of the plastics, in imitation ivory, black, green, onyx, tortoise-shell or any one of a number of finishes.

The forend tip is the final touch to a fine custom-built stock. This bit of decorative material *must* be attached in such a manner that it seems to be *growing* from the end of the forend. Anything less than perfection at this point would defeat the entire purpose.

Fig. 1 shows a modern "sporter" stock with forend tip of "Buffalo Horn"—which means an actual tip of the horn of the African or Philippine Water Buffalo, or of "Genuine English Horn," which is a lump of moulded horsehoof. This latter is usually better material than any other. American rendering plants do many things with the hoofs of the animals they take in. Perhaps they really make glue out of them. Our English brethren clean and steam and mould them into a splendidly useful material for forend tips, butt plates, and grip caps.

Whether we use "horn" or one of the very fine woods for forend tips, the manner of attaching is of prime importance.

Fig. 1 shows a Springfield rifle with such

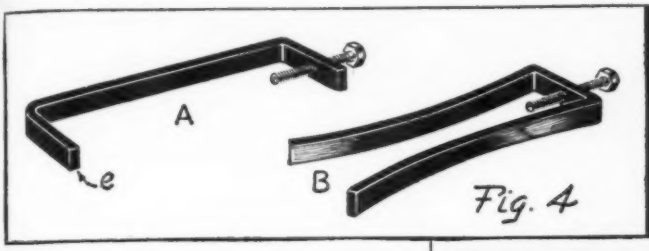


Fig. 4

Left: Two types of clamps that can be used in attaching the forend tip in place.

Below: Several examples of finished tip designs.

Gunstocks

a forend tip. Fig. 2 shows the common method of attaching this type of tip made of horn, ivory, or wood, as it was done a few years ago. Fig. 3 shows a better method of attaching a tip of horn, bakelite, celeron, tenite, or dark hardwood. This method is not recommended for attaching ivory, ivory colored plastics, or light colored woods.

Fig. 4 shows two styles of clamp for use in attaching tips by the method illustrated in Fig. 2. Clamp "B" is designed for use with a heavy bench vise, when such use is practicable. Clamp "A" is intended for use with any rifle having a box-magazine, permitting the end of clamp (e) to be inserted into the magazine-well.

Note, that in Fig. 3, no clamp is needed, as the long, heavy screw holds the tip firmly to forend, and is covered and thoroughly concealed by the plug which tops it. Obviously, this method is practical only when some dark material is used, and obviously, it is superior for the reason that the screw maintains a perpetual pressure, instead of a temporary pressure like the clamps used in other methods.

Fig. 5 illustrates several methods of shaping and finishing forend tips. Don't make your forend look like a war club—give it a graceful, streamlined finish.

Fine sanding, oiling, buffing and hand rubbing are advised for all of the forend tip materials mentioned.

In carving any of the designs illustrated on page 127, be sure that the tools used are as sharp as possible. Various techniques are employed in the actual process of carving, but as the shapes to be turned out are quite simple no difficulty should be encountered.

Although simplicity is usually the keynote of this particular part of the gun, some may want to add a little ornamentation. If you are fortunate enough to own one of the little power grinding outfits now on the market, considerable elaboration can be added.

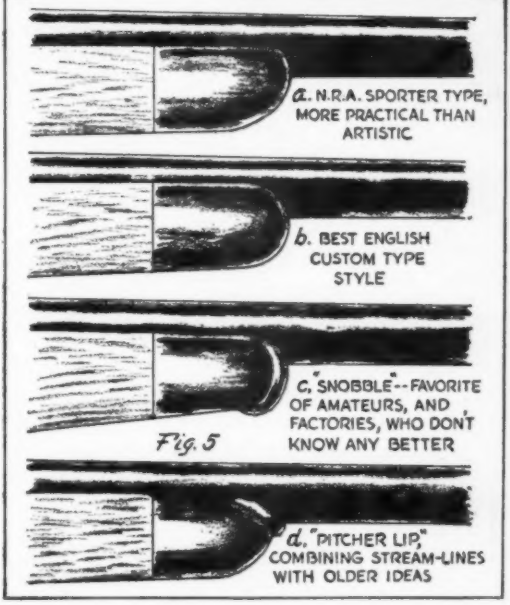

a. N.R.A. SPORTER TYPE, MORE PRACTICAL THAN ARTISTIC
b. BEST ENGLISH CUSTOM TYPE STYLE
c. "SNOBBLE"--FAVORITE OF AMATEURS, AND FACTORIES, WHO DON'T KNOW ANY BETTER
d. "PITCHER LIP," COMBINING STREAM-LINES WITH OLDER IDEAS

Fig. 5

Rifle enthusiasts often have in mind some special type of ornamentation that they have seen on some more expensive rifle than their own. It is fairly easy to imitate much of this craftsmanship if a careful study of the original can be made. It is not wise, however, for the amateur to attempt too complicated a job. A few minutes of careful observation will often enable the amateur to simplify certain decorative designs without materially reducing their beauty.—*Clyde Baker.*

IN NEXT MONTH'S ISSUE

For outdoor sportsmen who like to carry on their activities all winter we present a profusely illustrated article on the ins and outs, hows and whys of ice fishing.

DECORATIVE PROJECTS

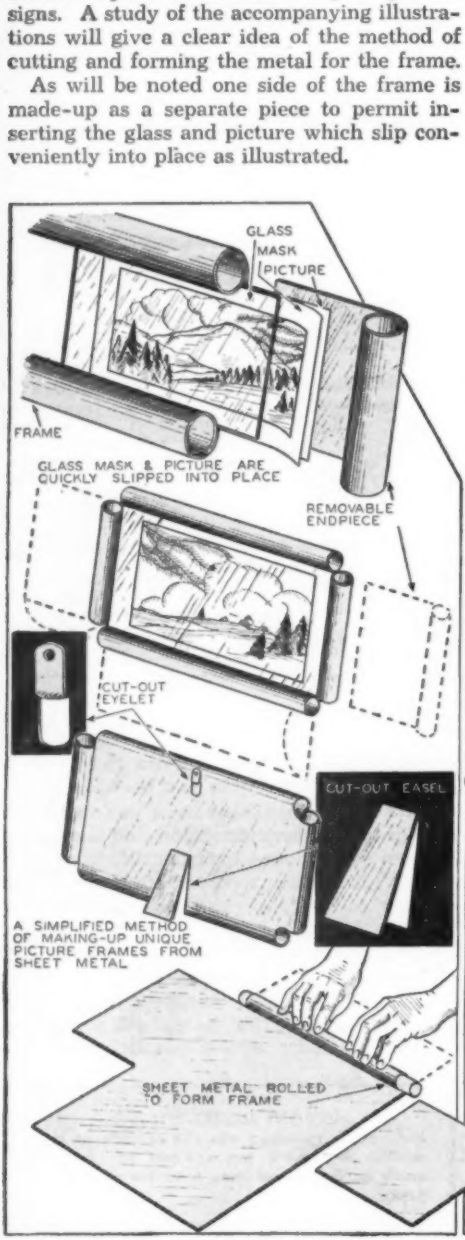
WITH this simple method flat sheets of scrap sheet metal may be converted into attractive picture frames of many unique designs. A study of the accompanying illustrations will give a clear idea of the method of cutting and forming the metal for the frame.

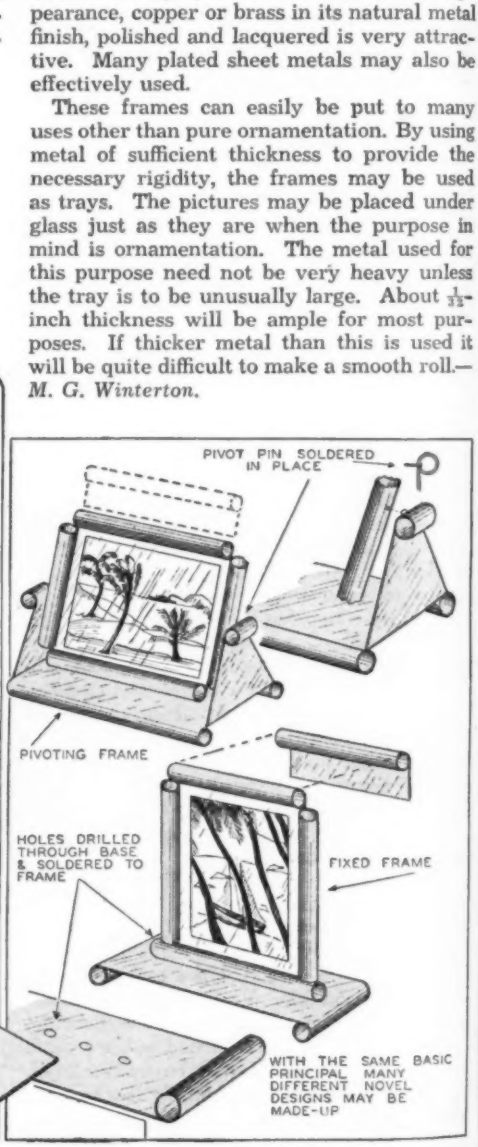
As will be noted one side of the frame is made-up as a separate piece to permit inserting the glass and picture which slip conveniently into place as illustrated.

The frame may be made with an easel for standing or an eyelet for hanging up. With the one basic principal many different designs may be worked out.

A number of different sheet metals may be used, ordinary tin attractively enameled provides a neat job, but for a more artistic appearance, copper or brass in its natural metal finish, polished and lacquered is very attractive. Many plated sheet metals may also be effectively used.

These frames can easily be put to many uses other than pure ornamentation. By using metal of sufficient thickness to provide the necessary rigidity, the frames may be used as trays. The pictures may be placed under glass just as they are when the purpose in mind is ornamentation. The metal used for this purpose need not be very heavy unless the tray is to be unusually large. About $\frac{1}{32}$-inch thickness will be ample for most purposes. If thicker metal than this is used it will be quite difficult to make a smooth roll.—*M. G. Winterton.*




PIVOT PIN SOLDERED IN PLACE
PIVOTING FRAME
HOLES DRILLED THROUGH BASE & SOLDERED TO FRAME
FIXED FRAME
WITH THE SAME BASIC PRINCIPAL MANY DIFFERENT NOVEL DESIGNS MAY BE MADE-UP

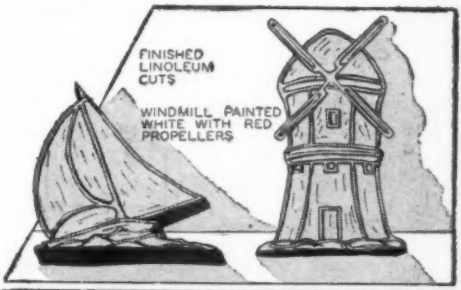
FROM THE WORKSHOP

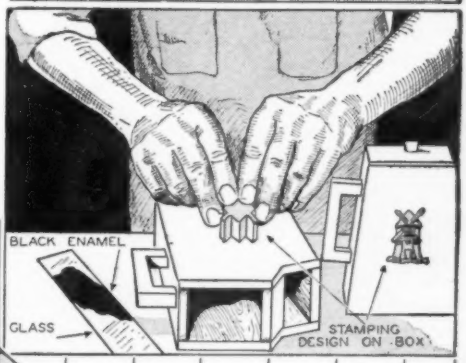
LINOLEUM block printing offers a new and simpler method of painting designs on novelties, furniture, etc. They may be successfully used to replace the rather messy method of stenciling designs on the walls. Linoleum blocks may be purchased already prepared or the blocks may easily be made. Glue the regular $\frac{3}{16}$" floor linoleum to the face of ¾" plywood, clamp and let dry.

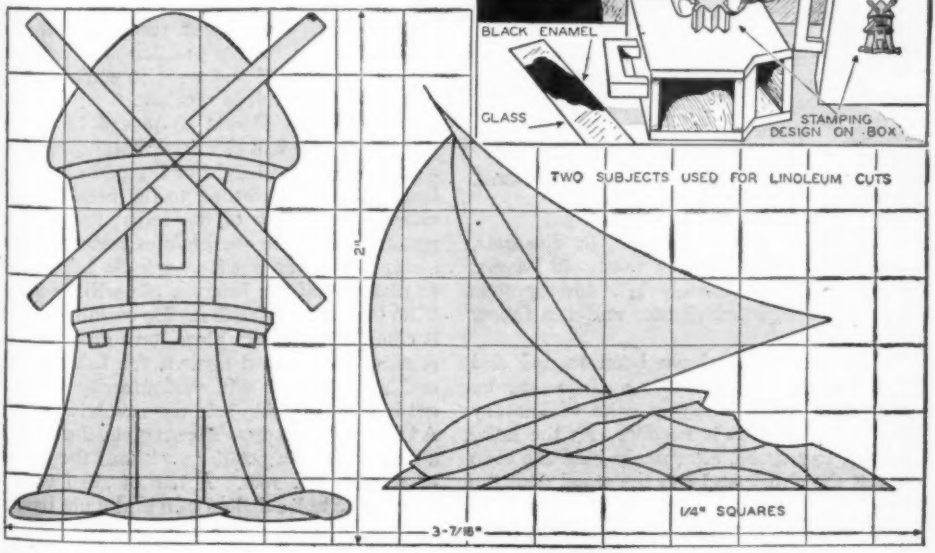
Subjects for designs may be selected from magazines and traced on the linoleum. The piece is then cut out on the outline on a jig saw or with a coping saw. The carving out is done in the same manner that any linoleum cut is made, leaving only the lines that are to be printed. See drawings of the two cuts. To make the print, brush a thin layer of paint or enamel over a piece of glass. Press the stamp down onto the painted glass, then, stamp the design where it is desired just as you would a rubber stamp. Make a few transfers on a scrap of wood to make sure the cut is perfect before applying it to the finished work.

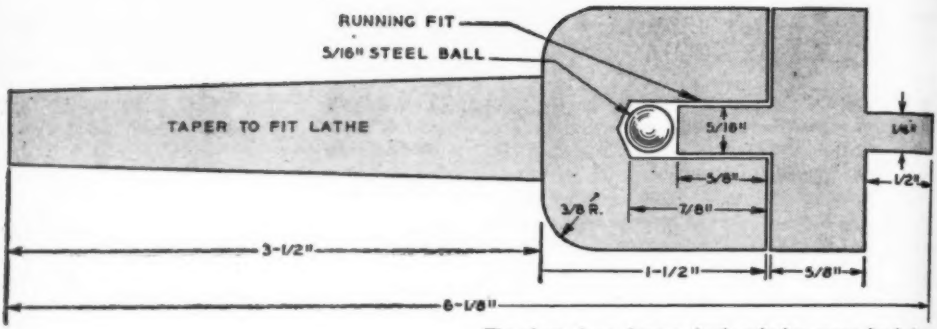
This method is a big saving in time where a great number of designs are to be made. When through using, clean the stamp with turpentine. Wall decorations for the play room or the child's bedroom can be made in the same manner. A variety of designs can be cut and then duplicated where desired.

The basement recreation room is another place where linoleum cuts can be put to advantageous use. Designs or figures of an appropriate nature can be used to decorate both the walls and the furniture. In many cases they can be utilized to break the monotony of blank painted wall surfaces with less expense than paper hanging. If the designs interest your guests you can lend them the cuts to decorate their own rooms.—*Dick Hutchinson.*

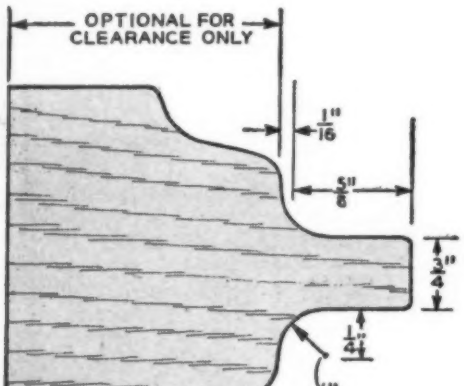




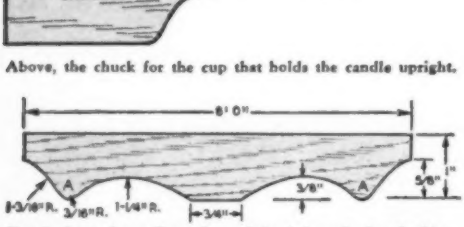




The photo above shows a simple spinning center for lathe.



Above, the chuck for the cup that holds the candle upright.



Sketch above shows dimensions of chuck for spinning the base.

[*Continued from page* 97]

the candle holder base is ¾" in diameter, therefore the follow block used will have a diameter of approximately ½". Photographs show the completed chucks and the follow block.

When the chucks have been turned and sanded, a tighter, smoother surface may be given them by soaping—a cake of laundry soap being all that is needed. As the lathe turns at low speed, alternately hold the soap against the chuck and rub the wood with the heel of the hand or a crumpled-up piece of paper towel. The friction forces the soap particles into the pores of the wood giving a very smooth, glazed surface.

For the spinning operation only two tools will be needed—a point tool for forming the metal and a diamond point for trimming or cutting. These tools are shown in photo.

On the faceplate mount the chuck for the base of the candle holder. Place the follow block loosely against the chuck, set the tail stock so that the quill is out about two inches and clamp the tailstock tightly in place. Put one of the 6" discs between the follow block and the chuck and run the follow block up tightly against the metal. Enough pressure must be put against the metal disc so that it will not be thrown out of the lathe when it is started. Be careful to center the metal disc before starting the lathe. After you have gained some experience it will be possible for you to insert and center a disc while the lathe is in operation, but until experienced don't try it. You must remember that a piece of metal in this position will act as a buzz saw would if you were to come in contact with it while it is rotating.

The tool rest should be placed in such a position that it will clear the metal disc about a half inch. The height of the rest above the bed will vary according to the height of the worker, the make of the lathe, the type of rest used and the worker's experience. For a start, however, set it at spindle height and so placed that the fulcrum pin will be about 2" to the right of the disc. Be certain the rest is clamped tightly in place for a great deal of pressure is exerted against the fulcrum pin and a loose rest will undoubtedly mean a cut hand if you slip into the revolving metal. A tool rest of the type shown gives the worker a number of pin positions without the bother of moving the rest. A bar of steel with a number of holes drilled in it and a pin having

[*Continued on page* 160]

An All-Purpose Workshop Light

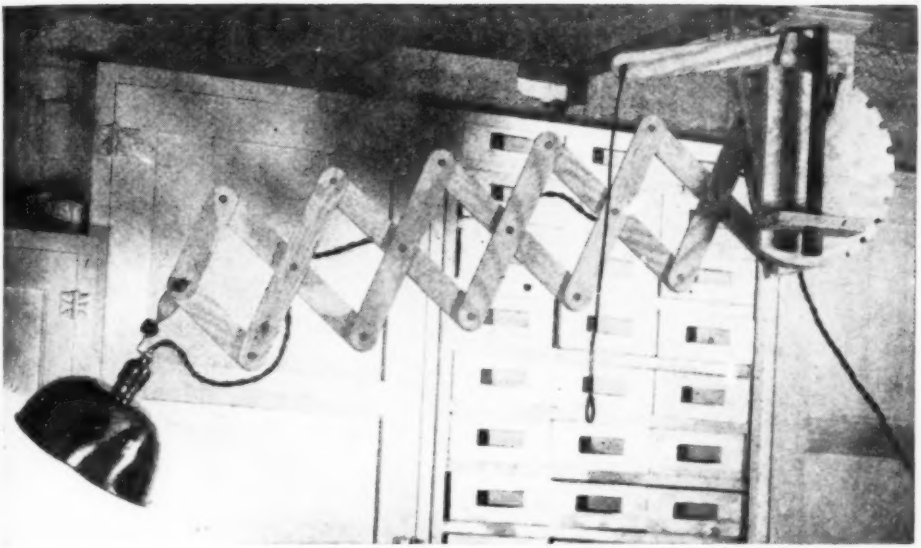
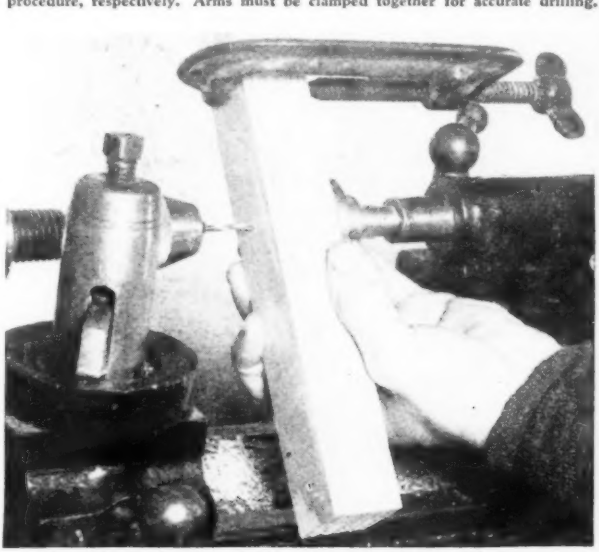


Photo A, above, and B, below, showing completed lamp, and arm drilling procedure, respectively. Arms must be clamped together for accurate drilling.

THIS light unit was particularly designed to serve as a shop light for photographic use: thus two were made. Their usefulness in this field may be seen at a glance. They are capable of extreme adjustment while at the same time can be pushed up out of the way, a decided advantage over a floor lamp. All these points are of value even when the lamp, using ordinary lighting globes is used for general shop lighting.



The links of the lazy tong are cut from ¼" 3 ply paneling. Be very careful to see that the rivet holes at each end are the same distance from the center hole. Using a vertical drill, or lathe, clamp several links together as shown in photograph B, and drill, after carefully locating the holes. One of these is then clamped up with the next lot, thus not only locating the holes in these, but also assuring that all will be alike. After drilling, the links are cut round on the ends (photo C) by dropping the end rivet holes over a pin fixed temporarily to the jig, or bandsaw. The pair of short ending links are formed by cutting two links pivoted on the center rivet hole at this time. The lazy-tong may now be riveted together. However, if you wish to paint the light unit the links should be painted before assembly, and allowed to dry thoroughly. [*Continued on next page*]

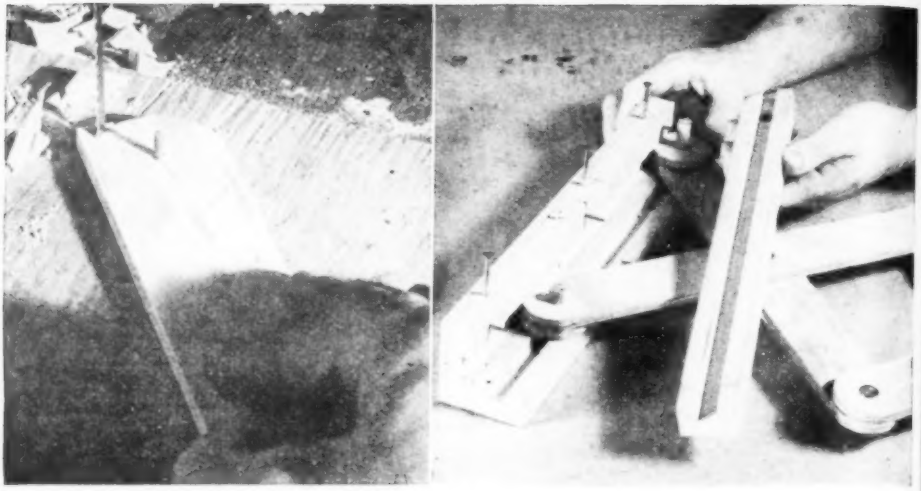


Photo C, left, and D, right, show rounding of arms and construction of slide.

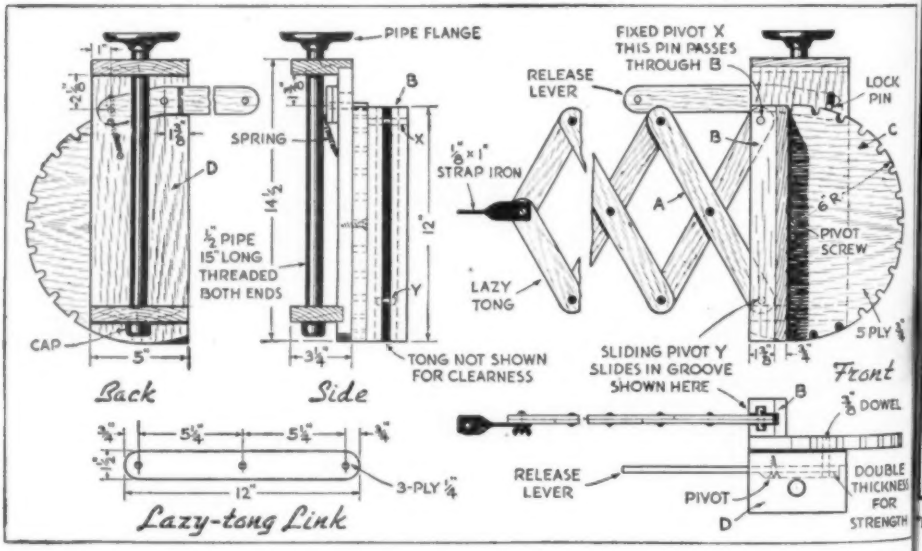
When assembling the lazy-tong use flat headed rivets, and under the riveted end place a bur, or washer, then a small spring washer, covered in turn with another bur. This will assure a "snug" working job.

The slide which controls the lazy-tong may now be made. The grooved pieces, forming the sides (photo D) should be cut from some hardwood such as maple or birch. The rear member is grooved as shown, to clear the link ends.

The rivet holes in the two link ends, which are to slide, are enlarged to take a short piece of ⅜" dowel, and a ply-wood washer as shown. The upper dowel pin shown in this photo (D) and marked X in the drawing is cut long enough to pass through slide unit B thus forming the fixed pivot. The lower pin, (Y in drawing) is cut shorter than X and forms the sliding pivot, and runs in the grooves in the side members of assembly B.

Part C was cut from 5-ply ¾" panel. The notches for the lock pin are formed by drill-

[*Continued on page* 134]



"No-Stoop" Tripod Extension

[*Continued from page 93*]

quarters of an inch in diameter on the outside and five inches long. A $\frac{1}{16}$-inch circular brass plate with a ¼-20 stud bolt soldered in its center, is soldered to the top of this tube. At the bottom of this tube a brass ring, made from a piece of $\frac{3}{8}$-inch tubing, is slipped on and soldered into place. The next step is to insert the small tube into the large tube and solder another stop ring at the top inside of the large tube.

Brass is preferred as the material for the tubes because it is easy to solder and to work with generally. Any finish may be employed. In the model illustrated here, the outer tube is finished in black crackle while the inner tube has a chrome surface.

At least a hundred different negative filing systems have been invented since photography's beginnings. Some call for a separate, supplementary card file; others are more practical. A simple dodge, yet one that's often overlooked, is the practice of mounting the negative in the picture album with art corners—under the album print. This keeps the negative out of the way, yet within ready reach. It's excellent for beginners who haven't as yet learned how to "read" negatives.

The print is first tacked onto the album page by means of four art corners. Once the corners are secure, the print is removed and the negative inserted into the corners. The print is then inserted over the negative; there's room enough to accommodate both. It is a simple matter to remove and replace the print and negative whenever reprinting of the negative is desired.—*Robert Gustavson.*

Pop says he doesn't need a darkroom! He gets the same effect by blindfolding himself!"

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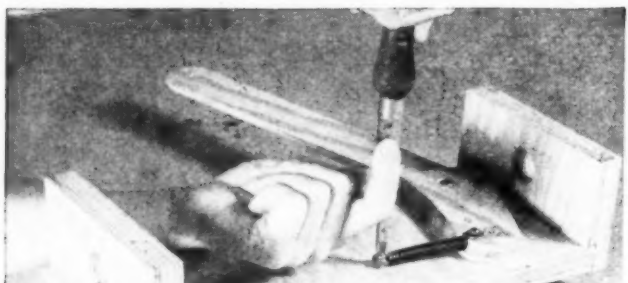
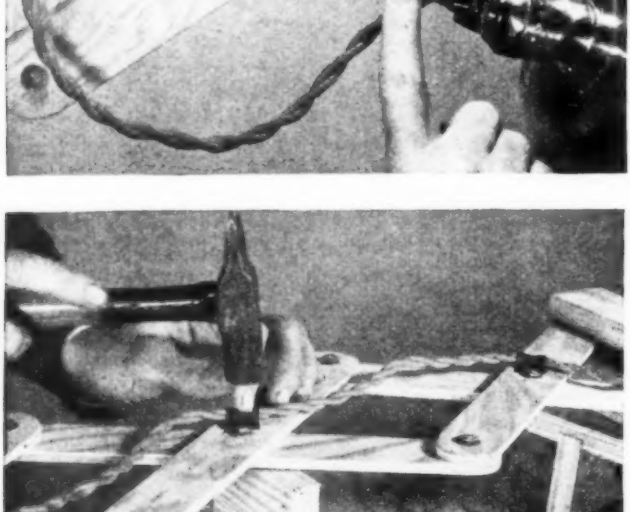


Above, Photo F, Attaching the locking spring. Below, Photo G, Lamp swivel.



Above, Photo H, Mounting the lamp cord.

An All-Purpose Workshop Light

[*Continued from page* 132]

ing properly spaced ⅜" holes, and then cutting with the saw from the edge of C to each side of the holes. Part B is secured with screws to part C.

The assembly marked D is the post bracket. The locking lever is secured to this member, as shown, with the locking pin passing through D engaging the notches in part C. As shown in photo F, a spring must be attached to the pin end of this lever, and to D to hold the locking pin down, and thus engage the notches in C, locking it. Part C, as may be seen from the illustrations, is fixed by one screw (or rivet) to D. This is called the pivot screw in the drawings.

The pivot post is formed from ½" pipe, equipped with a cap at the lower end, to prevent the unit slipping off: and with a floor flange at the other end for securing to the ceiling.

The lamp socket brackets are formed from ⅛"x1" strap iron bent and fixed as shown in the closeup (no. G). The light cord is secured to the lazy tong as in photo H with small pieces of friction tape and 1 oz. cut tacks. Be sure to extend the rack to make sure you allow enough slack in the lamp cord.

The reflector is nothing less than a 5 & 10 aluminum mixing bowl. A hole is cut in the bottom just large enough to take the socket end snugly, then it is screwed up onto the threaded portion, where it holds itself quite securely.

A lamp of this nature should not be wired into any circuit permanently.

Fighting The Tuna Pirates

[*Continued from page* 48]

swells as she bears down upon the poachers. Her spotlight flares out and its beam fingers the nearest victim.

Like a flock of frightened chickens, the pirate fleet spreads. Bells jingle frantically, winches groan, engines cough and sputter. Hardly a chance to run, for the mile-long net, with its heavy burden, anchors them to the spot. It's a question of cutting loose a five-thousand dollar net and chancing a risky getaway, or facing the law and a stiff penalty for poaching—plus confiscation of the net and other gear!

As the *Gray Gull* pulls alongside the first seiner, Adkins steps to the bow, megaphone in hand. "You are under arrest for fishing with a net in closed waters!" he shouts. "Stand by until we return and we will convoy you into Avalon."

Meanwhile Captain Smith bends over a large ship's compass equipped with a micrometer scale, sights on two nearby beacons that wink from the distant Catalina Island, and reads his captive's position.

"West End light bears 208 degrees, Ship Rock bears 102." In his log he enters these figures opposite the name of the poaching vessel; then cramps the wheel, opens the throttle, and speeds after another pirate.

Before long, a dozen or more craft are herded together awaiting convoy. The *Gray Gull* circles to pick up the trail of fleeing poachers, for the wake remains for many minutes upon the smooth waters. Some may make their getaway, for often as many as fifty poachers have flocked to one spot. Once, under cover of the general excitement, two seiners tried to help a fellow pirate by taking over one end of the net and making off with it, fish and all, but their escape was short-lived, for their wide track made it easy for the *Gray Gull* to trace them.

Now and then a pirate will show fight, and the patrol boat has had several narrow escapes from being rammed by captured craft. But a shot across the bows usually takes the fight out of the poachers and if the crew decides to "gang up" on the officers there's a tear gas gun handy to subdue them.

Sometimes Adkins may board a raider and stay until morning with a grumbling, hostile crew who would be only too glad to dump him overboard. But there is a fast patrol boat bringing up behind and a radio-equipped police system with airplanes ready if needed. So the group of raiders reluctantly falls into line and the *Gray Gull* shepherds her charges into port. Next morning a sullen, grumbling bunch of poachers is arraigned before the judge at Avalon and held for trial under stiff game laws. So the nomadic schools of tuna that come into California waters rest and feed under the protection of a patrol service that makes fish piracy a dangerous and losing game!

WANTED

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Through The PERISCOPE

"Henry's been so busy at the office, I hired a carpenter to catch up on his hobby."

Here's a tip to you inventors: The United States Army is looking for an ideal light machine gun.

Notice to this effect is carried in the current issue of the technical journal, *Army Ordnance*, giving specifications to be met and describing tests that are to be fired during the month of October, 1941. The specifications boil down as follows: Weight of the gun must not exceed 22 pounds, so that one soldier can carry and use it easily. Over-all length must be 38 inches, or less. It must be air-cooled—liquid cooling adds weight and is a messy nuisance in a weapon that must be ready to move at a split second's notice. It is to be bored and chambered for the standard .30 caliber Army cartridge.

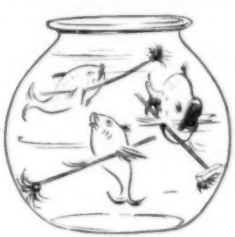
The new gun must have its barrel capable of being unscrewed from the front, so that a new barrel can be put on in a few seconds. The barrel must be heavy enough so that it can be fired at full speed (300-350 shots a minute) for five minutes without stopping.

It must stick close to the ground, to present as low a target as possible. Mounted on its tripod, the gun should not exceed 18 inches in height.

Ammunition is to be fed in from the left side, in metal-link belts. Cloth-web belts are apt to make cartridges stick in wet weather, and box-magazine and clip feeds are not considered satisfactory.

There are some other specifications, mostly technical in nature. But if a machine gun can meet the requirements as just stated, have the stuff to "take it" under regular knockabout field conditions, and be able to swing through a wide arc of fire, it should have a good chance of adoption as the standard weapon of its type for the new U. S. Army.

Well, we've finally found out what became of the three little fishies that swam over the dam! They're working for General Electric, doing a man's job in the plastics research laboratory of that company, and everybody's happy, including the man whose job they're doing!



It's like this: A large glass jar is used in the laboratory for keeping a constant temperature bath for measuring viscosity in plastic materials. The inside of this jar has a tendency to collect scum, making the glass opaque. Since it was necessary to make frequent observations of what took place in glass tubes inserted into this bath, the jar had to be emptied once or twice a week and scoured. The scum stuck to the glass, and it was a tedious job for Samuel Johnson, one of the company's chemists. He tried different acids. They didn't work. Having seen snails in fish bowls, put there as scavengers, he tried them; but, since the temperature of the water in the jar varied, often reaching as high as 98 degrees, the snails crawled from their shells and died.

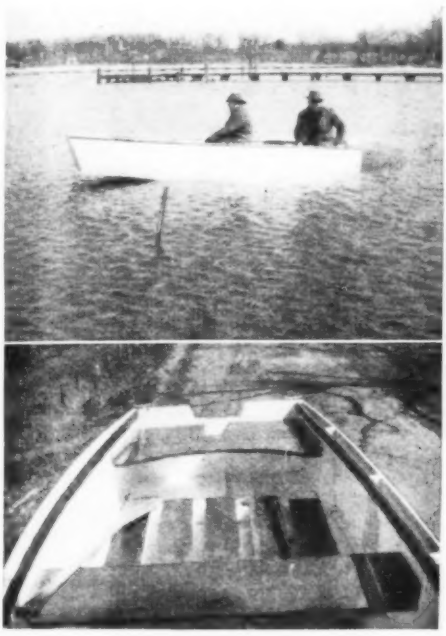
Just by chance, Johnson bought the three gold fish at the "five-and-ten." The fish took to the job with enthusiasm, and within two or three days the scum had entirely disappeared. That was three months ago, and since that time it has not been necessary to clean the bowl. It's a perfect arrangement: Johnson is happy because he doesn't have to scour the bowl any more; General Electric is happy because the fish find food in the work they do, consequently they work without a "salary"; and the fish, we have it from eye witnesses, are fat and frolicsome, delighted with their new place in American industry!

—*Cliff Taylor*

"With this model you don't need electricity."

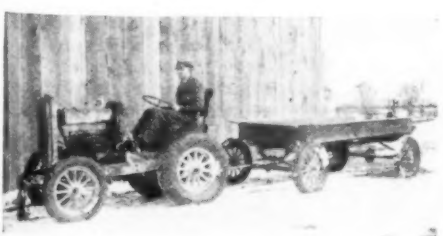
Editor's Workbench Chips

[*Continued from page 19*]



"Enclosed find pictures of a pram I have just completed by elaborating on 'Midge' in the No. 5 Edition of HOW TO BUILD 20 BOATS. I have built in a keelson and keel and she has seven frames. It is constructed of white oak, spruce and that coming favorite, Super-Harbord plywood. This is my second job from your excellent plans and am ready to start my third."

For this letter and the two pictures above, George Curtis, 1201 Beacon Street, East Chicago, Ind., wins a $3.00 Workbench award. The water shot shows "Midge" making good headway carrying two husky men, with only a ¾ h. p. outboard "kicker." The other picture is a close-up of the stern and shows the neat workmanship.



"This photo shows the tractor and trailer which I built myself," writes A. Hann, of Hartford, Mich. "I used a Chevrolet four-cylinder motor and a Model T truck rear end. I cut down the axles, giving it a 44-inch tread. The wheelbase is 56 inches. A Model T car chassis was used for the trailer. It carries 1½ tons with ease. I find this tractor-trailer combination very useful around the farm."

And Mr. Hann will undoubtedly find his $3.00 Workbench check useful too!

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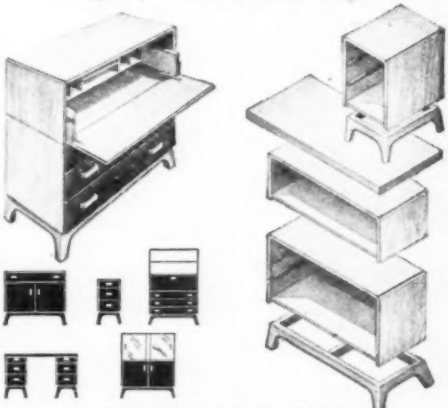

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Glider Pilots—Aces Of The Future

[*Continued from page* 39]

Northwest; fifth at Arvin, California, where I have flown many times; and the sixth on the outskirts of Wichita Falls, Texas.

From the beginning, each boy should be tabbed as to his flying likes and dislikes. As he progresses through school, he not only learns the basic principles of flight; his instructor determines where the boy will fit best into the picture, and can recommend him for particular training in his sectional Junior West Point. From here, if selected, he hops into the Air Corps for advanced tutoring in powered planes. As a raw, punk recruit? Scarcely! He's already a flying man, capable of soloing in a quarter the time required for a beginner.

In five years, school training plus advanced instruction in the glider academies would give us no less than 250,000 top-notch glider pilots ready to master airplanes in a few weeks. Those not picked to enter Air Corps schools well may continue annual glider training, exactly as military reservists sweat and labor through two weeks of hedge-hopping and machine gunnery every summer, thus keeping their collective hands in the game and ready for concentrated flying when the bugle blows.

Many times I have chased other gliders around the sky, clicking pictures with a camera gun mounted on the cockpit.

I have dropped quarter-pound sacks of flour, tightly wrapped so as to fall in a straight path, smashing into a dozen circles painted on the floors of western valleys and on the Mojave desert.

I have practiced, sometimes aloft myself, again directing other pilots from the ground, describing movements of make-believe ground troops, shouting the description down in lieu of speaking soft words into a radio mouthpiece.

And as I climbed and circled, dogfighting with another sailplane pilot; as I dove on a field sandwiched between oak-studded hills, bombing until those sacks splattered near the circles' center; as I and younger fliers maneuvered, sometimes keeping the trim ships aloft through sheer willpower, and described ground maneuvers . . . do you think I was becoming any less skilled in handling my sailplane? Do you think any youngster undertaking these complex evolutions would be worse for the experience? Some become through such experience literally part of their machines, which eventually sets the aerial genius apart from the average pilot.

Will Uncle Sam's 5,000,000 eligible eaglets go for gliding and the thrills offered by soaring flight? Suppose we glance briefly at Frankfort, Michigan, for a preview of coming events whose shadow flits across the Frankfort dunes every day of good soaring weather. Three years ago Frankfort was comparatively unknown. Then in 1937, glider enthusiasts who earlier had heard of favorable winds sweeping in from Lake Michigan started trekking to Frankfort to try their motorless wings. Finding soaring conditions to their liking, in the summer of 1938, 20 pilots staged an open meet, an event of no great importance for the record, except that it presaged the greatest community boom in flying interest yet known, anywhere. There are, remember, no more than a thousand relatively skilled glider pilots in this country. Yet more than 1,000 of Frankfort's population of 1,400 . . . men, women and eaglets . . . have soared. For a complete record, let it be said that some 5,000 peaceful soaring flights will carry folks aloft over the Frankfort dunes during the current season of mass annihilation on foreign shores.

There's a thrill to gliding not shared by pilots of powered planes. Therein, I believe, lies part of the reason why a wide-scale program of training will attract hordes of candidates. At an Elmira meet, for example, Chet Decker rode rising air currents two miles, straight up. Bob Stanley shortly set a new American record . . . 17,676 feet. Not yet satisfied, he promptly went up again, and came down from an even higher climb, 18,054 feet. Martin Schempp headed into a thunderstorm near Pittsburgh, was sucked upward and tossed out through the "roof," hail stones having so riddled his wings they looked like four guns from a pursuit plane had blasted him as he climbed.

I guarantee youth will swarm like locusts into the Civilian Glider Corps schools. Already hundreds of unknowns are taking to the air in gliders, many in machines assembled from kits purchased from manufacturers. Well may they take wing, too, for our oceans are shrinking.

Not long ago two British bombers flew nonstop 7,160 miles from Egypt to Australia. A range of 10,000 miles is not impossible tomorrow. Meanwhile, in another 12 months, the United States will have more squadrons, although nowhere nearly as many as President Roosevelt has called for. The new crop of pilots spends three months in a civilian school, three months each at Randolph and Kelley Fields and then goes on to tactical squadrons for advanced training. Even now, 396 cadets enter nine army primary flying schools every six weeks. Each successful candidate who finally wins his wings costs your Uncle Samuel $25,000. Too, he must be not less than 20 nor more than 27, have attended college two years or pass an equivalent examination. This system must be broadened.

Gliders are not a cure-all. By no stretch of a fertile imagination can they take the place of powered planes. But I will venture one prophecy:

Start 'em at 12 on models, and shortly the generals can call out enough pilots to beat back any attack, no matter from what quarter it may come to plague us!

The "FM-Special"

[*Continued from page* 103]

is the PM8-CT speaker mounted in an attractive cabinet of the "bass reflex" type. This housing is not large enough to accommodate the folded antenna, but a single wire either about five and one-half feet or eleven feet long, connected to the upper antenna post on the receiver, and the wire placed in any convenient location, will work quite well for stations within a radius of ten or fifteen miles.

As a matter of fact, trial reception on a short length of wire is the best means of determining if your receiver is going to operate properly from a folded doublet. If satisfactory reception is obtained with the wire, then you may be sure that the doublet will be quite all right.

If the building in which the receiver is to be located has a steel framework, watch out for reflections. You may find that pick-up is poor in one part of the room and excellent in another. Also keep in mind the fact that a doublet antenna is directional. If the cabinet on which the doublet is mounted is facing the wrong way, reception may be poor.

Details of the folded doublet are given in Fig. 5. The two lengths of solid copper wire, each approximately five and one-half feet in length, are held in position by the six stand-off insulators. The lower ends of the wires are secured by a silk thread, though two more stand-off insulators can be used if desired. Do not make sharp bends in the wires. Curve them at the points where they are secured by the insulators. The lead-in or transmission line connects to the upper ends. This line may be any length that may be required.

If you are within range of only one f-m station, cut the wires to the proper length for that station. The formula for calculating the length of the wires for any given frequency is included in Fig. 5. The example provided is based on the assumption that the frequency of the desired station is 43 megacycles.

If you are within range of two or more stations, match the length of the doublet to the frequency of the station that is weakest, or cut to a length that falls midway between the frequencies of the two stations.

All f-m receivers have a high hiss level when not tuned to a station carrier. When the receiver is properly tuned to a station, the hiss and noise interference will disappear—providing the signal is strong enough. *It should also be observed that if the signal is too weak to saturate the limiter tube, distortion as well as noise background will be present.* The signal *must* be strong enough to completely eliminate all hiss—though not necessarily strong noise impulses—if distortion is to be escaped. If this is not possible on first trial, the gain of the receiver may be increased somewhat by shunting the 400-ohm resistor in the cathode circuit of tube V4 by another of like value (R7) or by replacing the 400-ohm resistor with one having a value of 200 ohms. If this change is not

[*Continued on page* 140]

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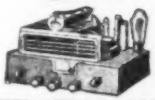

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Snow And Ice Fun

[*Continued from page* 109]

A Snow Cave

One of the easiest ways to make a durable snow cave is to build a mound of hard-packed snow, shape to the general outline shown. Dress down the sides with a shovel until smooth. Then splash water all over the exterior in below-freezing air. The outer surface becomes a hard ice shell one or two inches thick. When this has been done, cut a hole through one side and shovel out interior as illustrated. The walls should be five or six inches thick. If you wish, water can be splashed on the inner walls too, to make a double ice shell with packed snow between. Such a cave or hut will last all winter even though it's used frequently. If you plan to build a fire inside, make a small hole up through the top. This need not be more than three or four inches in diameter.

Rubber Kick-Back

Pick two trees on opposite sides of a stream and fasten a wire around each trunk with a strip of inner tube from four to five inches wide between them so that the rubber is drawn quite taut and about waist high above the ice. You can skate into this at full speed, facing forward or by skating backward into it. The kick-back will stop you without jarring, then send you in the opposite direction again in good speed.

An Ice Track for Coasting

One of the better ways to ice a new track down the hill for coasting consists of rolling an oil drum down in which has been placed some heated water. Fill the drum half full on top of the hill, build a fire around it, then slowly roll it down the hill after the water is hot. It will be best if you walk in front of the drum, bracing your body against it with mittened hands, thus regulating the speed of descent. The barrel of water does two things. Its weight compresses the snow and its hot water melts the top of the surface which later freezes into a track so slick even a home-made sled will show the speed and alacrity of your sport catalog's latest offering. Two or even three trips down the hill will give you a track so wide that you'll have no difficulty in keeping on it even at excessive speeds.

Ice Quoits

Cut out four discs of close grained wood six inches in diameter. Sand the edges and then turn three wood screws through each of a length which will permit about one-half inch of each to protrude through to the under side. Lay out the court with the center of each circle 40 feet apart. The larger circles are a yard in diameter, the smaller ones are six inches in diameter. Crossways and through each circle center, scratch a line behind which the contestants must stand.

In principle, this game is played like horse shoes. Two players work against each other, each tosses two of the screw-studded quoits. The screws prevent the quoits from sliding so you'll have some little trouble in becoming proficient at first. Having the disc stop on the inner circle counts three, having it touch closer than any other counts five. If a quoit is within the outer circle and closer than any other but not touching the inner circle the count for that quoit is one.

Ice-Snow Stunt Track

If there is a fairly steep hill rising abruptly from the edge of the lake or river ice, you can make a stunt track like the one illustrated, to provide thrills all winter long for either skaters or coasters. The track should be well packed or iced, then, a little way out on the ice, the snow leap is built up with packed snow and iced down with water drawn up through a hole in the ice. The height of this leap need be no more than twenty inches.

Keeping Skates from Rusting

A good way to keep skates from rusting is to bury them in the oil soaked box of sawdust shown. When you want them again there won't be a speck of rust on them.

The "FM-Special"

[*Continued from page* 139]

sufficient to bring the signal level up to the proper point, string the doublet along a picture molding (to gain height and complete horizontal suspension) or use an outdoor antenna of the same type.

After the first minute or two of operation, the receiver will have to be retuned to compensate for a slight amount of frequency drift due to the heating of the tubes. In tuning, adjust for maximum tuning-eye closure only in the event that this point also corresponds to the point of minimum noise. The edges of the electron beam of the "eye" are clear-cut and practically stationary when the set is properly tuned. If the point of minimum noise and the point of maximum eye closure are considerably apart, the receiver is properly out of alignment.

When the receiver is first placed in operation, let it run for about a half hour; then adjust the antenna trimmer (reached through the rear hole in the gang condenser cover, as shown in Fig. 3) with an insulated aligning tool. Do this very carefully, adjusting the trimmer for maximum eye closure. Then, with the same care adjust the trimmers on the 2nd and 3rd i.f. transformers T3 and T4, reached through holes in the shield tops. Adjust for minimum noise and/or maximum eye closure.

Success Down His Alley!

[*Continued from page 58*]

would stay put for weeks, perhaps months. In that time, he got a lot of thinking done, cut a lot of patterns. When he emerged from the hospital, he was ready to go.

First he got a quantity of the hard, cured rubber of which bowling balls are made, and cut it into cubes. In each cube he drilled a hole, all of slightly different diameters, so he would have one to fit exactly each thumb or finger.

Then he took a ball, and dapped out a large area of it, so the cubes could be carefully adjusted to take just the right grip. A locking device was installed, so the cubes could be held steady and the ball swung. Thus any ball Doc made would have just the right sized holes for any individual's grip, and just the right span for his hand. Bowling balls could now be as individual as tooth brushes.

The business began on a small scale. Doc was just getting nicely started when grief overtook him. The balls he was using were inferior, and he had to replace 500 of them! Through no fault of his own, he had to dig up a cool $7,000.

It broke him. For a time, he was down and out. Then a friend lent him $500 to begin again. Using a different make ball, he had another try at it. Presently all the big bowlers in the country were coming for his exact fitting. It is said his method has 140,000 possible combinations, against 35 possible combinations under the old system.

Doc has his mouse trap, and the world is beating its path to his door. The invention is supporting his family, his son's family, and giving employment to his daughter.

If Doc isn't making money, the limousine manufacturers must have turned Santa Claus. You ought to see the chariot he drives!

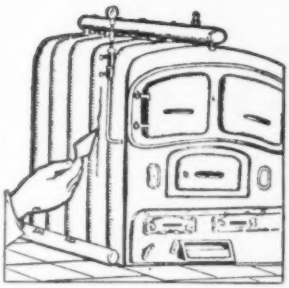
Sailors Go To Kindergarten

[*Continued from page 42*]

Great Lakes, Ill., and San Diego, Cal. Newport is the oldest in the group. It is located on a small island in Narragansett Bay—a place intimately associated with memories of important events in American Naval History.

When a recruit is accepted into the U. S. Navy he is trained for the job he has undertaken at one of the four training stations. He undergoes an intensive training course, lasting eight weeks, during which time he crosses the bridge between civilian life and naval life and work. He is taught the fundamentals of seamanship, the routine of life aboard a Man-o'-War, how to lash, unlash and swing his hammock, is taught infantry drill, the rudiments of naval gunnery, the use of the gas mask and other arts of the naval warrior. In addition, he is taught to swim, if he cannot already do so, and is initiated into the correct method of pulling an oar. By the time the eight-weeks course is over, the recruit no longer regards himself as a recruit. He is ready to take his station aboard ship.

How to save money on home repairs



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Under The Hood Of The 1941 Cars

[*Continued from page* 75]

gears the engine will pick up the load quicker and with less need for "revving" up. That is why Oldsmobile's Hydra-Matic Drive includes the automatic four-speed transmission. Use of fluid instead of a mechanical coupling does save gear shifting but the chief advantage lies in saving rear-end strain, rear tire wear and clutch repairs.

When Chrysler speaks of Fluid Drive this year certain interesting improvements are included. One is the addition of an annular ring on the driven member of the clutch. This overcomes the vibration period which some drivers noticed at certain speeds. Then there is the dashpot control on the carburetor which prevents stalling on decelerating by the simple process of retarding the rate of throttle closing. Oldsmobile has refined Hydra-Matic Drive with the addition of an interlock control which automatically puts the control lever in neutral position when the starter pedal is depressed.

Poking around under the Oldsmobile hood I found they are using insulators on the carburetor to improve hot weather performance as well as to prevent stalling. Another thing that surprised me was a drain in the cylinder head to prevent water from collecting around the spark plugs.

How other manufacturers meet the challenge of fluid transmission of power with special gearing effects is part of the 1941 picture of motor progress. Cadillac, for example, has stepped up its engine output to 150 horsepower through use of higher compression and, like Pontiac, offers an economy axle. Buick's larger engine delivers 165 horsepower so that a high percentage of driving can be done in high gear. Featured in the Cadillac engine are hydraulic valve tappets which maintain clearance at zero regardless of whether the valve stems are contracted or expanded with the heat. Buick's special design is the use of pistons with a hump, the effect of which is to roll gas mixture into a "ball" around the spark plugs. This highly compressed fireball fires instantly but with less tendency toward pinging. In the Studebaker Champion engine tin-plated aluminum alloy pistons are provided with a heat dam and non-scratch rings. In the Americar's clutch driving plate there are hydraulic vibration absorbers.

Hudson has done away with the complicated system of rods and joints for the throttle control, substituting more direct and positive connection between accelerator and throttle. Hudson piston rings are "pinned" so that they cannot rotate, thus preventing ring chatter and irregular wear on the cylinder walls.

Ingenious in the line of ignition changes is the new type of spark plug featured by Hudson. This plug's porcelain insulator is ribbed in petticoat style, these ribs effectively preventing any tendency for high tension current to jump the insulator. Studebaker now forces the driver to declutch when starting the engine through placing the starter button under the clutch pedal. Not only does this save extra work for the battery and an extra operation for the driver but eliminates risk of the car moving ahead or back should the engine be started when the car is in gear.

Chrysler engineers claim 500 per cent increase in bearing life as a result of thin babbitt main and connecting rod bearings. Developed by Isaac Babbitt in 1839 this metal continues in popularity despite the fact that higher bearing loads placed such great strain on the babbitt that it had a tendency to crack, but research engineers discovered that so long as the layer of babbitt over the steel backing is less than 5 thousandths of an inch bearing life can be increased over 500 per cent. Another Chrysler innovation is the Gerator-type oil pump, an extremely simple unit with only two working parts both of which are molded from powdered metal known as Super-Oilite. Thus the pump is unusually quiet while forcing oil constantly at definite pressure even when the engine is idling.

Engineers are still battling for supremacy of their ideas. A perfect example is Chevrolet's scrapping of the crowned top piston in the face of what Buick has done with its fireball piston. Chevrolet now uses flat-top pistons but the cylinder head has been revised to obtain better combustion. This year the Chevrolet water pump is equipped with two outlets to the cylinder block so as to cool both sides more uniformly.

Under the glitter of kaleidoscopic colors the 1941 cars offer numerous surprises. Important is the fact that automatic tops on Mercury and Lincoln-Zephyr are electrically operated instead of by engine intake suction. If it is raining you can put the top up without risking exposure to carbon monoxide by running the engine in the garage during the process. New, too, is the use of a pair of rear quarter windows in the convertible coupes of De Soto and Hudson. These eliminate bad blind spots in this type of car. The extra windows go up and down with the top.

Push-button radio tuning was the inspiration for Hudson's lighting switch. Pressing the tab once brings on the city lights, while a second flip gives the country driving combination with choice of driving or passing beams with the usual foot button control. Another flip of the tab and it's "lights off." Chevrolet's front doors each have locks so that the driver can exit or enter on either side. Pontiac has designed the link end of the pendulum lever of the emergency brake control so that it cannot freeze in icy winter weather. If the hydraulic braking system of Hudson should fail the brake pedal goes into immediate action with a four-wheel reserve mechanical braking system for double protection.

Vacuum boosters for gear shifting are offered on Plymouth and Chevrolet. Pontiac has an overcenter spring on the clutch pedal which helps the

driver press the pedal down. Reduction in clutch pedal pressure on Ford has been accomplished in another way. Here the clutch pedal's retracting spring has been changed so that the force required to pull the pedal back diminishes as the pedal is pushed down.

Packard's new Electromatic clutch is, basically, a mechanical clutch with booster control but by reason of using several solenoid controls the clutch operates so as to engage slower or faster, depending on whether the car is starting in low or reverse, or is being shifted to second or high. An extra control on the instrument panel provides a way for the driver to make the automatic action of the clutch operative or inoperative. So highly refined is this clutch that a governor switch is provided for the purpose of preventing clutch release above 12 miles per hour except when overruled by the direct speed switch, thus preventing the car from free wheeling in high gear until a low car speed has been reached. This arrangement also permits use of the engine as a brake when slowing down.

In lighter vein there is the Cadillac gas tank cap which is uncovered by lifting up one of the hinged tail lamps. Nash features a two-way ball bearing steering system while on Buick the steering gear provides for a steering nut which rides over the worm on a continuous stream of steel balls. That greatly reduces driving fatigue. Nash also uses coil springs all around like Oldsmobile and Buick, but an ingenious touch on the Nash Ambassador "600" is mounting the shock absorbers inside the rear coil springs.

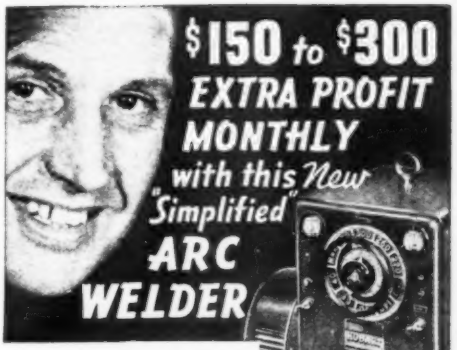
It is definitely a comfort to peer into the works of Plymouth knowing that the counterbalanced hood cannot drop down on your head. Lid of the luggage compartment also is counterbalanced. A new note in comfort is found in the 1941 Mercury where the coil springs for seat cushions are covered with a layer of foam rubber.

No picture of the 1941 innovations is complete without noting the new plan of giving buyers choice of engines. With any model of the 1941 Oldsmobile or Pontiac you can have either a six or a line eight. There's plenty more to be seen under the hood of the 1941 cars but if you digest half of these innovations you'll find 1941 a year of real mechanical significance.

Chemists say that the only truly synthetic fabrics being made are nylon, glass, and Vinyon—rayon being technically a "modified fiber."

California's record-breaking 15,000-foot oil well was drilled so precisely that the bottom of the hole was only two and one-half degrees off vertical.

Courses in aviation mechanics have enabled 85 CCC boys in California to obtain work in west coast aircraft manufacturing plants.



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They've Loaded Their Trucks With Glamour

[Continued from page 56]

it into a shop, and the business became a reality.

By 1926 they were able to buy an adequate building and the property on which it stood. New machinery was purchased to the tune of the last remaining loose dollar.

Two days later the place burned to the ground. And no insurance. The little matter of insurance was being put off for a short time. Advance was forced to retreat. But not for long. A local banker had been watching the boys since they started the venture. He came forward—far, far forward—and loaned the four partners enough dough to erect a truly modern plant. The day this place opened for business, Advance owed the bank $109,000.

The money was paid back in an amazingly short time. Advance has ever since been steadily advancing.

In furnishing the nation with mobile billboards the outfit lists Joe Morgagni as president and general manager, Accomazzi, general superintendent of the works, and v. p. Louie Pontrelli fills in as metal shop superintendent because of his early training as a blacksmith. The other Louie—Joe's brother—handles the finishing department; painting, enameling and sign work. (Joe points out that all titles are interchangeable; nobody gives a darn who is which.)

Besides the four partners and W. Everett Miller, the artist, the firm has two other department heads. Tex Chambers is on the selling end of the tanker section; and how he knows his tanks! His latest baby is a revolutionary type of tank truck to supply airliners with fuel. The tanker automatically keeps the cargo at engine heat while en route to the airport, eliminating the necessity of wasting time while the plane engine warms up. Most major oil companies are now using them.

Bert De Blin handles refrigerating equipment, studio jobs, fire engines, utility trucks for light and power companies, all-steel lift vans for railroad use, and the like. Just now he has a $200,000 special unit under construction which, when completed, will be the world's first mobile industrial X-ray machine—of which more later.

Advance's chief engineer is Maurice Tures. His specifications for tank truck safety measures are recognized and have become state laws in many places. He recently evolved a new type of case hauling truck for the Los Angeles Coca-Cola Bottling Company. Because of its light weight and what Tures calls "stress distribution," this truck can carry a payload worth twenty percent more than any other truck of its size.

Big jobs and little come to Advance Autobody from all parts of the country. An order for a big fleet from one of the nation's great industrial concerns gets prompt attention; but no more so than does the small business man who needs only one small unit of transportation for his product.

"It's because of our army training," says Joe. "We gotta be fair and balanced with everybody we do business with."

Joe and his three partners think there is nothing like army training to fit young men for business. Each firmly believes that it was due to the discipline they learned while in the service that enables them to succeed so well in all dealings with their fellow men. In fact, they are so convinced of it that, as each of their sons reaches the age of eighteen he is immediately "requested" to go do at least one hitch in either army or navy. He can take his choice. There has yet to be an objection from one of the younger Advance family fledglings.

Joe Morgagni finds that being responsible for bringing beauty and color to the motor hauling business brings a few laughs, too. There is the case of the young screwball who drove into the shop and demanded that his passenger car be painted light blue on one side and bright red on the other. The job was duly completed. The fellow was about to drive away in his strange looking heap when Joe asked him the why of the striking paint job.

"Well," the young man drawled, "y'see, I'm forever getting into small accidents." He winked brightly. "And ain't it going to be fun to hear them witnesses argue!"

To Advance one morning the mailman brought a letter of inquiry from a large firm in England. "Would you care to enter a bid on a fleet of pantechnicons?" asked the letter.

Joe's secretary handed him the letter in silence. Joe read it and rang for his partners, who, in turn, rang for the rest of the help. Too much for the front office, the whole gang went down into the works. One after another the entire personnel read it. No soap. The entire gang had followed the missive from person to puzzled person. It wound up in the hands of a startled apprentice whose greasy hands shook as he stumbled over the word. When he looked up from the letter with that same querulous expression that had become epidemic a sigh of utter defeat was heaved in unison.

Dead silence held sway for fully three minutes. Finally Joe exploded. "These damned foreigners," he yelled. "Why don't they learn to write English!"

They huddled, then sent out for a dictionary.

A few months later Advance shipped ten lovely pantechnicons to the British firm, after a successful bid. But this was only through the help of Mr. Webster, who informed them that a "pantechnicon" is "a moving van; a closed truck."

There are, of course, many more standard trucks on the highways than individually styled trucks. The difference is the same as that between an assembly line—or standard—passenger car and a

[Continued on page 146]

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They've Loaded Their Trucks With Glamour

[*Continued from page* 144]

"custom-built"—or made-to-order automobile body. Standard trucks more than fill the bill in combining beauty with utility; as witness the great creations of G. M. C., White; Ford; et al. They manufacture beauties on the assembly line. You can buy a mobile billboard that is a dream on wheels to haul your product—and suit your purse. Most American firms, to be sure, make happy use of the standard trucks. And well they may. But, sometimes a firm will actually need a certain type of truck body to fill a specific need or advertise, while hauling, a highly original product. There may not be a standard make that meets the particular want. It is then that the firm in the market for stylized mobile units must turn to such creators as Advance Autobody Works. Too, as in the case of Coca-Cola, there are outfits that must have "individualized" units to set them apart from others as much as does their own trade-mark.

Joe and his boys, along with other custom body builders, must be able to fill unusual and peculiar orders. This takes a combination of imagination, engineering, art, ingenuity—lots of headaches and hard work.

It took all of the above qualities plus endurance on the part of all hands at Advance that day when Joe Hierogoyen, Twentieth Century-Fox Studio's transportation head, called Joe Morgagni on the telephone.

It was about four in the afternoon when the call came through.

"Hey, Joe," said Hierogoyen, "we gotta have an armored car. You know, like the banks use to haul money."

"Fine," Joe Morgagni answered. "But why don't you just rent one from a local bank?"

"Can't," was the answer. "An ordinary bank truck won't do. We need a special one with ladders running up the outside to the top gun turret."

"Ladders on an armored car—?"

"Sounds screwy. But it's the most important bit of action in the picture."

"O.K.," said Joe. "I'll send Bart De Blin out in the morning for the specifications—"

"Won't do," cracked Hierogoyen. "We must shoot the scene in the morning!"

"You—you mean you want the truck by morning?"

"Yep. Sorry, but we had a slip-up out here someway. Grab a pencil and I'll give you the dope on what this truck is to be like."

Joe grabbed a pencil, got the dope, and called in the entire company. After a ten minute general huddle off came Joe's coat. The other partners followed suit. Down into the works—or shop—went the whole gang. They got things ready during the one hour in which Miller designed, and Tures, the engineer, made working drawings of the truck.

The understatement of the year would be to say that it was a hectic night around the place. However, at nine the next morning, Bert De Blin proudly drove the quickly made $20,000 armored car—with ladders up the sides—through the massive gates of the movie lot. Far be it from Advance to hold up production!

The pet at Advance just now is the industrial mobile X-ray machine; and a tricky little number it is. Roughly, it is a huge X-ray machine mounted on a truck chassis upon which there are tracks to hold and guide the X-ray.

In sheet metal construction work—shipbuilding, and the like—it is necessary to weld steel plates together. Sometimes there will be flaws in the welded seams. They can be detected only by an X-ray examination. To date, the method has been to move the heavy machine, weighing many tons, along the job to be examined in the best possible way; ropes, pulling, pushing, huffing, puffing. It is a tough, cumbersome job. It is also hazardous in that the loss of an X-ray means the loss of a fortune. Such a delicate apparatus cannot be handled roughly.

The new unit will enable quick and easy movement of the X-ray. Sitting on its tracks it can be moved to either side of the truck and pointed down at the object to be examined. The truck will merely drive slowly along the welded seams—a cinch. A two-hundred-grand cinch!

In keeping with Joe's democratic notions, this big job gets no more detailed attention and pampering than did the lone but amazingly beautiful wine hauling unit that Advance turned out not long ago. With it the wine company has made a colorful affair of transporting bulk wine from the winery, out in the country, to the bottling plant in the heart of the city.

On a six-wheeled Autocar chassis firmly rests a huge cask, real in every respect, made of genuine redwood and hooped with snappy brass bands. The entire unit says, or shouts, "Wine!" even to the beholder who neglects to read the neat lettering sandblasted in rustic shingles on either side and on the rear end of the cask. The unit is as much in keeping with the California landscape as the old missions it passes every day on its way into the city. While transporting 3,000 gallons of wine, the capacity of the tank, this three ton truck is a first class attention grabber. It is so striking that the wine firm receives many letters about it, for the public is very much aware and appreciative of the trend on the part of industry to add color and beauty to the outdoor scene while performing usual tasks.

"Even we," said Joe Morgagni, "get swell letters about that truck." Then he added, with a grin, "Did you ever before hear of a truck that received 'fan mail'?"

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Racing Death Down The Great Lakes!

[*Continued from page* 87]

They were out on the surface of one of the world's fiercest waters—Lake Superior. In the inky darkness the ship drifted before the heavy gale toward the treacherous rocks of Keweenaw Point, graveyard of scores of ships. As the ship neared shore the helpless crew could hear the roar of the storm-tossed waters, as the waves dashed and broke against the rocks a mile away.

As the mighty roar of the storm-dashed waves grew closer, members of the crew of the ill-fated schooner asked themselves, "Will we hit the higher rocks and be smashed to pieces immediately, or will a kind wave carry us to be berthed on the shoals to ride it for a time?" These and many other thoughts raced through the minds of the men as giant waves rushed the *Bangor* closer to the rocks and destruction.

With a resounding roar, a powerful wave, a veritable avalanche of water, carried the ship high up on a rocky shelf. She held together! Each succeeding wave rocked her back and forth like a cradle. Her underpinning was insecure and she was perched perilously some 200 feet from shore, taking a terrible licking from the giant combers as they swept in. The crew were as securely imprisoned as if in a tomb! It was impossible to cast off in a lifeboat in such mad waters; apparently it was also impossible for the ship to last long where she was grounded.

But the ship held together the remainder of that terrible night, while the frightened crew expected each new wave to rip her apart, as rocks sawed into her steel from beneath and waters hammered her apart from the sides and top. Riveted beams resounded with the cracking boom of cannon at each onslaught of water, while spray froze on her decks and sides until the entire ship was encased in heavy ice. Yet, it was this ice, engineers later declared, which kept the ship afloat until messages had been flashed to the U. S. Coast Guard to send a rescue party and save the stranded crew!

Each Great Lake storm seems to have its particular freak occurrence, as did this historic blow. Under the Arctic temperature, water washing across the *Bangor* froze almost immediately. Before sunrise an artificial ice bridge had been constructed, joining ship and land. Over this bridge the abandoned ship's crew finally safely reached shore. Later, salvage crews used the bridge to rescue most of the cargo.

"The Last Trip Down the Lakes" each fall is a race unsurpassed in daring adventure anywhere. In no water on earth is there a more thrilling race with disaster and death than the one run by the gamblers of the Great Lakes. Each crew tries to squeeze in just one more trip before icy fingers lock the harbors.

If winter comes early, the race may be run in late October, more often in November or early December, but always the shipowners and the crews are willing to continue the desperate battle until ice locks the lakes for another season. The race continues long after marine insurance companies have refused to protect cargo and ship.

There is not a port of consequence on the Great Lakes but sends forth from one to a score of ships whose crews throw caution to the winds as they set forth on waters that may quickly become raging seas. In the late fall and early winter, these lakes become one of the world's fiercest storm centers. Hard gales, born in the Northwest, sweep down the lakes, through the St. Lawrence valley and out to sea, leaving behind millions in property damage and many lives sacrificed.

It is not alone the billion-dollar side bet of cargoes which might otherwise remain stranded in ice-locked ports that causes the crews to set forth on the great gamble; nor is it the wages which lure the men from the comforts of home to stake their very lives on the table of chance. Here, on these inland seas, as on the mighty deep, there is the mysterious call which men cannot evade—the "call of the sea." Even when wintry blasts whistle down from the polar seas, warning men to be aware, the crews are eager to set forth upon the lakes.

Millions of tons of grain and ore pour into the holds of the long, slim steel cargo carriers, in readiness for the race from Duluth, Port Arthur and Fort William. At Detroit, thousands of shiny new motor cars are placed aboard, to be hastened to distant points in time for Christmas. Whistles blow, bells ring, farewells are shouted, and the mad race is on to Buffalo, Cleveland, Montreal, and other lake ports.

Each fall our newspapers, and the radio newscasts, tell us of the thrilling race of Great Lake crews; of how they win, or how they lose, as men wage battle against the elements. If the season is especially long, as in 1939, the fleet will keep going right up to the holidays.

It was in late December when the *Agawa*, carrying a crew of 21 men and a million-dollar cargo of wheat, set out to make the last run down the lakes. But the ship ran up on Advance Reef, near Manitoulin Island, Lake Huron, in a bitter storm, and for days members of the crew were imprisoned in the ice-coated observation room, with little food and less heat. Day and night, every minute, they were in constant fear the ship would slip off the narrow reef and plunge all to the bottom of the icy sea.

The ship's stern had been torn apart when she grounded and had plunged into about seven fathoms of water. The bulkhead and engine room soon filled with water. The fires were extinguished. The radio went dead. Too far from land to leave the ship in safety, with 50-foot rollers sweeping over the rocks, the crew had

Death Down Great Lakes

abandoned all hope of rescue, since this part of the shore is far from human habitation, and there seemed not the slightest chance that another ship would pass along until next season.

Goddess Luck was with the ill-fated men. An amateur radio fan, at Mindenoya, had caught the last few flickering flashes of the ship's weak SOS, just before her radio went dead. He flashed the news through to the nearest port. Soon rescue parties set forth, and the tugs *General* and *Strathbogie* left Sault Ste. Marie under full steam. But the storm made progress almost impossible, and it was many hours before the little boats were within sight of the stranded freighter, being battered to pieces by mountainous waves.

The severity of the storm made it impossible for the tugs to draw near enough to render assistance. The imprisoned men on the glistening frozen fort signalled that they had neither food nor fuel, and begged to be rescued as soon as possible. After hours of pounding, the seas subsided a little, and the tug *General* managed to rescue the entire crew, together with their bold skipper, Captain W. C. Jordan.

The same storm carried several other ships to destruction. The *Altadoc*, helpless because of the crippled steering apparatus, was blown completely across Lake Superior, and sent crashing on Keweenaw Point. After a desperate effort, four members of the crew managed to launch a small boat and battled their way to the shore through pounding waves and ice-clogged waters. Several times their frail craft was all but swamped in the less than a quarter of a mile distance to land.

Ashore, they hiked nine miles through three-foot snow drifts to Copper Harbor Lighthouse. Suffering from exposure and nearly exhausted the men were bundled into sleds and transported to Calumet, where they related the predicament of their twenty comrades on the wrecked ship.

It was on Isle Royal that one of the worst disasters of the romantic history of the lakes happened. Here the *Algoma* was sunk with 200 souls aboard. For years a white-haired pilot sailed the lakes. Once he confided that he was wheelman on the ill-fated ship and that his hair turned white in that terrible night, when, clinging to a small plank, he heard the agonizing cries for help as the water sucked the great ship down. Hours later he was rescued, still clinging to the plank, half wishing that he, too, had gone to a watery grave with the others.

Testing soldiers for color blindness, the U. S. Army finds the simple old test of sorting skeins of yarn most satisfactory.

A University of California agriculturist is spending six months in Australia studying sheep, hoping to find sheep that will improve wool quality of California flocks.

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There's Art To Being Inventor!

[*Continued from page 64*]

First there is the spine exerciser, a rather terrifying stretcher in which the "patient" lifts himself up by the chin and puts the spinal detours back on the roadmap of health. A harness under the chin and around the base of the skull is attached to a compound lever, controlled in turn by hand cords. A basic patent was secured after prolonged argument with patent office clerks who had to be convinced that the lever was wholly different from a simple pulley arrangement.

The exerciser is operated under surgical supervision in connection with a system of individual spinal chartings, which Hawxhurst calls sylographs, whereby the body is shown in semi-transparent silhouette. A total of 390 small squares cover the profile and posterior view of the patient, enabling minute recording of all lateral, posterior and anterior curvatures of the spine and subsequent correction.

However, the everyday health exerciser is the less strenuous Spine Knead, consisting of two parallel wheels fitted with rubber tires. The "tires" have marble shaped nibs that act like massaging fingers on either side of the spine. You just clamp the knead on a convenient door, sidle up to it backwards and scootch up and down like a cat rubbing its back on a telephone pole. The cerebellar fluids are stimulated, and the spinal cushions are fluffed up as you would a feather pillow. It's good for the chest expansion, leg muscles, and is injurious to fatigue!

The bewildered visitor departs from the amazing studio of artist-inventor Hawxhurst. Out in the yard Mrs. Hawxhurst is provisioning the family trailer for a week-end sketching trip down the coast. This mobile studio, which its present owner surprisingly did *not* build, has been fitted with complete water and lightning systems, a 20-gallon storage tank feeding water under air pressure to an outdoor shower and indoor sink, and both D. C. and A. C., and presto gas, being available for illumination—and waffles.

On the sedan that's hitched to the trailer by a ball and socket coupling designed by the artist, is a manually operated signal. A small gravity switch runs the flashlight globe lighting unit.

Should Harry Hawxhurst and most any big scientific lab researchist be plunked down onto a desert island alone to battle the elements—it would assuredly be the artist who would devise some immediate means of squeezing food, shelter and a short-wave transmitter out of the nearest palm tree!

Rating a ton of coal 100 in heat value, a forestry professor says black locust has heat value of 102, and assigns ratings above 90 to such wood as hickory, white oak, ironwood, and black birch.

A bird bath should be partly shaded: birds dislike bathing in water too hot from the sun.

Fortune On The Floor

[*Continued from page 76*]

It was about this time that the Big Idea arrived. Why not make many such panels, that could be laid in a solid floor to save fine oaken flooring from dancers' feet at parties? You could even lay it on a flat lawn, or on the roof of a penthouse for outdoor dancing, and the panels could be small enough to carry in a light pickup.

For one man, at least, the depression had reached the beginning of the end!

But the struggle was only beginning. Flooring and pickup trucks cost money, but he scraped together a few dollars, how, he is not quite sure even yet, and founded the Mueller Portable Dance Floor Company.

There were many problems to managing such an enterprise. Paying the grocer was first; figuring the income tax was last. Then all of a sudden, a Hollywood caterer who had heard of the floor mentioned it to a Hollywood socialite who was giving an outdoor party, to be attended by movie elite.

The floor was engaged. Success was on its way. Indeed, it came at Mueller so hard he was tempted to duck. A list of the film folk who have rented the floor reads like a Who's Who In Hollywood.

In addition to bringing success to Mueller, the floor has revolutionized Hollywood's parties. Southern California summers are from four to six months long, dancing indoors is uncomfortable, but with this floor, in the cool garden, it is a splendid form of relaxation after a hot day.

The coming of success didn't dull Mueller's inventive genius. Carrying enough panels to and from the truck for a thousand or two square feet of dance floor is hard work, particularly when one frequently has to climb stairs. So he invented a wheelbarrow to do that job for him—a wheelbarrow to carry the floor and climb stairs.

Rather than one wheel, it has three, the front one in the conventional place, and two rear wheels on the rear rest legs. These legs are controlled by springs to aid in climbing or descending stairs.

When he wants to climb, he raises the front wheel in the air, and proceeds forward on the rear wheels until the front one is over a step. Then the weight is put on the front wheel, and the spring draws the legs forward until they rest on a step. The barrow's weight then goes on the rear wheels, and the front reaches the next step.

In descending, the barrow is drawn down backward, with the springs reversed. Rather than drawing forward to meet the rising step, the legs draw back to meet the descending step.

This machine has always been a subsidiary to the dance floor, but some day, Mueller plans to put it on the market.

This man's invention has not made him rich, but it has made him an extremely substantial income. Summer is the best time of the year, but there is no true slack season. His best week so far netted him $500.

(Correct Answers To Quiz On Page 67)

1. True.
2. False. It is a sliding weight used in the game known as curling.
3. True.
4. False. A catamaran is a twin-hulled boat.
5. True.
6. False. It is a cement used to attach "stage whiskers" in place.
7. True.
8. False. Teredos are shipworms.
9. False. Nostalgia is homesickness.
10. False. An anemometer measures wind velocity.
11. True.
12. True.
13. False. It indicates a particular type of hull distortion.
14. True.
15. False.
16. True. A service known as the "Ballon Poste" carried mail by balloon, on one occesion traveling as far as Norway.
17. False. The object is lubrication.
18. False.
19. True.
20. False.
21. False. A telephoto lens is a lens designed for long distance photography.
22. False.
23. True.
24. True.
25. True.

Attention, MI Readers!

We will pay $1 for each true-false statement which we find acceptable. Statements will not be acknowledged or returned. Address the Quiz Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York City.

Checks have been sent to the following: John Pokorny, New York, N. Y.; Theron G. Cady, Palo Alto, Cal.; Roland Ryder-Smith, Seattle, Wash.; David Henchen, Greenwood, Wis.; Edward Rorem, Slater, Iowa; Claude Mashburn, Muskogee, Okla.; Walker Brents, Fort Worth, Tex.; F. Reisdorf, Detroit, Mich.

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(Pages 27-32)
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California Cops Go To School

[*Continued from page* 81]

Smith, chief of police in La Mesa, a small town down near the Mexican border.

"Right," responded Gray, "and that simple explanation may mean the difference between convicting and acquitting her murderer. A jury might have decided shots were fired by two men, one close and the other from a distance."

Two hours later we move into the adjoining room, where another class assembles. Lt. William Hildebrand, expert in identification of loops and whorls, unfolds a black kit. From it, he draws a smaller black box; a combination rubber and glass tube filled with iodine crystals, cotton and a drying agent; several small transparent pieces of cellophane; and a bottle of off-white powder. Here he has the newest devices to developing and preserving latent fingerprints, impressions made weeks or months earlier.

Speedily, he moves the open end of the tube over a black metal container; like magic, the brown fumes from the iodine oxidize the solid matter, bringing clearly into relief the print of a right index finger. Now, he dusts the grayish powder over an adjoining print. As the lines come into view, he smooths the coated cellophane over the print, pulls it free and pastes it against a white card. Here, in a half-hour, 85 officers, representing two score of communities, see with their own eyes what a volume of literature might fail to convey. That old and formerly useless prints may be captured and kept, permanently indicting a suspect who may not turn up for many moons.

Now we recess for lunch, and at one o'clock assemble with a score of assorted officers in a photographic darkroom. Professor Adrian D. Keller is passing out assignments. "George, get a series of shots showing cars approaching, going over the crest and moving down hill. Stark, photograph a small board, and get good shadows. Whaley, I want two good mug shots of a brother officer." The group scatters to their afternoon's jobs. I remain in the studio. Whaley, a Glendale detective, places H. B. Stark, liquor control officer, against a white backing and proceeds to make close-ups of the type found in any police file. Daniel A. Johnson, an assistant, shifting lights until tiny fingers of wood cast long shadows over the board, snaps close-ups revealing all details of the narrow shingle. Playing at crime detection? Hardly. They're getting ready for important roles which may fall kerplunk into their laps the very day they return to their home stations.

Not all their work lies on the intellectual side. Before their courses are completed, every man must know the difference between a 50-pound and a 500-pound dynamite fuse. He must uncap a gas can without flinching and toss it into a theoretical mob. Woe unto him who throws the cannister against and not with the wind! He

California Cops Go To School

stands, with others in a circle, and tosses medicine balls, climbs fences and engages in wrestling free-for-all bouts. Building muscles to keep pace with intellectual development!

When Don and Daniel, Virgil and Dennie return to their posts, no matter whether it be a two-man department in the sticks or Los Angeles 2,800-man force, they no longer call each other captain and chief. First names become part of their stock in trade. When San Francisco calls on Escondido for help in nailing a hit-and-run driver or pinching a local gangster, a small town cop thinks in terms of a friend he's made at school. These meetings, aside from creating a new breed of scientifically minded officers, are developing an esprit de corps which spells cooperation with a capital C, and death to widespread criminal operations . . . especially organized gangs.

Indian Golf

[*Continued from page 69*]

ball off the metal stand. Putting is the toughest part of archery golf because it demands bull's-eye shooting. Unlike the golfer who shoots easy to sink his putt, the archer has to bring his bow to full draw, which means that if he misses his putt, his arrow will carry forty or fifty feet beyond the cup and put him in for plenty of shots before he holes out.

It isn't particularly hard to shoot an arrow straight and far. But when it comes to approach shots and "holing out," there is considerable difference in the skill of the archers. Most of them spend a great deal of time on the links shooting the heavy putting arrows into the "target" on the greens. It takes an expert shot to knock the cotton ball from the metal shaft seven out of ten at a distance of 25 yards.

Archery golf has already spread to the colleges and while many a modern Diana is shooting the course in par, Ken and Walt Wilhelm are playing archery golf with their desert cruisers—cars of their own design, built for hunting and prospecting in the desert. They use their hunting arrows—make every shot from the car and it's plenty tough to make a good shot from a car rolling over the desert at 20 miles an hour. They use a special course for this game, which is 30 miles around, up hill and down, in brush and rocks and what have you. The greens are 250 yards apart, and Ken and Walt never leave the car, even when retrieving arrows or "holing out." They've been from sunup to sundown, playing one round of archery golf.

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Christmas Tree Revolves

[*Continued from page* 111]

furniture casters of the swivel type. Lubricate them so they will operate easily. Bore a 1-in. hole in the exact center of the base, grease it and set the disk pinion into it until the casters rest on the masonite base surface. The disk should turn freely without appreciable wobble.

The electrical equipment consists of a small electric motor of the sewing machine type fitted with a small rubber friction pulley. Arrange this on a block of wood hinged vertically on one side of the base and placed so the pulley will bear firmly against the disk's edge. A spring can be fastened to the base as suggested which will bear against the block and exert enough pressure to prevent the motor pulley from slipping. Wire the motor switch at a convenient corner of the base.

For the lights, two slip-rings are needed which fasten to the 3-in. pipe stud on the top of the disk. Some machine work is necessary to do this job. First, in the middle of the pipe drill and tap three ¼-inch holes for three wing-bolts that have had their ends ground to sharp points. These are for clamping the tree inside the pipe. The slip-rings are shown in detail. Ring "A" consists of a ring of heavy gauge brass castellated with about five square teeth. Between it and the pipe must be inserted a wider ring or band of insulating fiber. Small screws fitting into tapped holes in the pipe may be necessary to make the assembly secure. But be sure no metallic contact of the slip-ring and the pipe is made at any point. If screws are used to fasten it to the insulation, be sure to sink their heads into the fiber. It must grip the pipe firmly with no chance of slipping. Solder a wire spring clip to the top edge and also drill the top edge of the pipe for a binding-post.

Slip-ring "B" is simpler. It consists of three segments cut out of a band made to fit around the pipe. These should be drilled for small screws and fastened at equal distances around the pipe into tapped holes just above the edge of the flange. Direct contact can be made to the pipe. The details of each ring are shown in the drawings and no trouble should be experienced in making them. It will be noticed that the spaces of the two rings are not in line. This provides a more pronounced twinkling effect rather than sudden contacts and sudden breaks. A bit of experimenting here however will enable the builder to determine just how many contacts he wants in his particular rings and the widths of the gaps.

The brushes can be adapted from an old auto generator or starter. They must have considerable flexibility to them so they will make firm but springy contact with the slip-rings. Mount them, holders intact, one below the other, on a solid board erected over the disk and across the base. Heavy angle irons will hold it solidly. This is suggested in detail. Each brush must touch its slip-ring so it makes a clean contact yet jumps the gaps to open the circuit. Wire the brushes to two binding-posts as shown with a 1 mfd radio

Christmas Tree Revolves

condenser bridged across. This reduces sparking as contacts are made and broken. Wire down to a second switch, cord and plug. The wiring diagram is self explanatory. If motor speed needs reducing insert a suitable rheostat in one leg of the motor line as suggested. Try out the machine to check its working condition and wire a light into the slip-ring circuit. Make any adjustments in the ring positions to gain the best twinkling effect. Then a decorated shield can be made to surround the base and hide the works.

When Christmas rolls around bring in your tree. Cut the butt so it will fit into the pipe. Fasten securely with the three wing-bolts and trim the branches so it is well balanced. Decorate it with as many strings of lights as you may need. Plug them into a common receptacle and connect the two wires to the binding-posts on top of pipe and slip-ring A. Move the tree into a position in the room where it can operate without interference and plug in the cord. Turn on the motor switch. The disk should commence revolving. If the speed is too great slow it down with the rheostat.

Now turn the light switch. As one of the brushes contacts each disk the circuit will be completed and the lights flash on. As gaps are met in the rings the lights will momentarily go out and then on again as the tree turns. Adjustment of brush positions, staggering of slip-ring positions and the number of contacts in each ring will greatly determine and control the twinkling speed and continuity.

So surprise the family and friends on Christmas with one of these new twinkling and revolving Christmas trees. It will put new life into the old celebration and be well worth while.—*L. B. Robbins.*

Circuit Tester From Fuse

[*Continued from page* 113]

The lower section, containing the burned-out fuses, can be discarded. To make the tester, saw the extending wings from the upper disc and drill a hole at each end of the remaining portion large enough to pass a No. 14 rubber-covered wire through it, as illustrated. Then solder the wings to the leads of the lamp (but do not disturb the resistor which is in series with it) and snap the housing in place. Taping the wires together just below the housing makes the assembly rigid and completes the job.—*J. M.*

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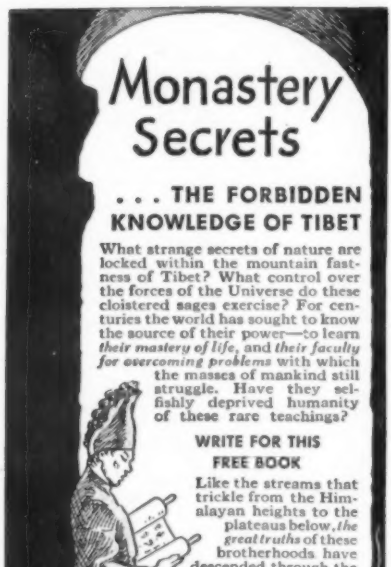
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Tiny Flying Models

[*Continued from page 124*]

Start the construction by cutting out the fuselage blanks, full size patterns of which you will find illustrated. There are five blanks numbered as follows: One piece No. 1 and two pieces each of No. 2 and No. 3 respectively. No. 2 and No. 3 pieces are further cut out as shown to accommodate the rubber motor if a flying model is desired. Before assembling the fuselage cut out and bend the propeller and mount it on a short length of very thin steel wire. Now insert the shaft in the end of piece No. 1 interposing a small washer between propeller and fuselage piece. Next attach a short length of the smallest size flat rubber obtainable. A very light fresh rubber binder will serve. The single length of rubber is attached to the tail end by slotting and cementing as shown. Now cement pieces No. 2 in place each side of No. 1 and add pieces No. 3 to complete the fuselage block. Sand the whole piece down to complete the lines using great care in this operation so that all unnecessary balsa is removed without actually endangering the structure. Add the landing legs and wheels. The wheels are made of two circles of 1/16" sheet balsa glued together and sanded to tire shape. The tail skid is a bit of broom straw. The front windshield supports are of similar material.

Now fit the tail surfaces after cutting them out of 1/32" sheet and sanding down to 1/64" or even less. The wings are cemented to the top of the cabin after first sanding a slight vee into the top to allow for the dihedral which is necessary for a flying model. If a scale model is intended cut the wings from 3/32" sheet and remove the curve on the cabin top before glueing in place. After the wings are fitted and the glue dried, sand the top of the fuselage flush to the trailing edge of the wing and you are ready to test the flying trim. Correct nose or tail heaviness by sanding lightly until exact gliding trim is obtained. The wings can then be further sanded down to paper thinness and the model flown. Too much cement only adds useless weight so apply it carefully and only where absolutely needed. In the flying model the detail is simplified or simply left out and no dope or paint employed to finish. The scale model should be completed to the last detail and finished off with dope paint in colors to suit.

The model makes a wonderful little glider and, if constructed properly, is really quite sturdy—banging into things without the slightest damage despite its tiny size and frail appearance.

Government chemists have discovered that treating vanilla beans with ethylene gas speeds up curing and improves the vanilla extract.

National forests brought the government nearly six million dollars in cash last year, from timber sales, grazing fees, and other permits and special uses.

Reconditioning Fishing Rod

[*Continued from page* 123]

by new ones. However, if the guides have not corroded too badly, soak them in a jar of gasoline. The ferrules and tip-tops can be removed by heating them slightly over an alcohol flame until the cement which holds them in place has melted sufficiently for them to be slipped off the joint end easily.

In many cases the makers of fairly good rods have used pins with which to attach the ferrules more securely. These are not really necessary in this day of excellent ferrule cements which can be purchased cheaply from your tackle shop. Old pins can be punched out simply by placing ferrule and rod joint end on a piece of soft wood and driving out with a sharp pointed instrument such as an awl. Tap awl slightly with a hammer, or preferably a wooden mallet, until the pin has been driven through far enough to be pulled out with a pair of pliers. (See Fig. 1.) Place all of the ferrules and tip-tops to soak with the snake guides in the jar of gasoline.

One of the most satisfactory methods for removing the old varnish is to first soften it with a good quality paint remover. Apply the remover to one rod joint at a time, several applications if necessary, until the old varnish has lifted and softened enough to be easily scraped off with a knife or a razor blade. Do not scrape so deeply as to cut into the bamboo for when the soft, gummy varnish has been taken off the residue can be removed by rubbing the rod joint with a piece of light gauge wire wool. As soon as a joint has been cleaned, scrub it immediately with a soft brush soaked in turpentine until all traces of the varnish remover have been cleaned off.

The one problem which might appear difficult is the removal of strains, or "sets," which may have developed in a rod joint due to carelessness or excessive use. Minor sets can be taken out in most cases. Extreme caution must be taken in the treatment lest you overheat the joint and melt the glue which holds the bamboo strips together. Then the strips would part and unless you are a past master in the art of rod building you will find yourself facing a situation hard to remedy. The set joint to be treated should be scrubbed in lukewarm water to remove any traces of turpentine, as the least remaining bit might take fire and cause damage to the joint seams. Then run the joint through an alcohol flame, from end to end, several times until the joint has become reasonably warm. Then rub it strongly three or four times from butt end to tip with a piece of damp cloth. Heat the joint only once again and then immediately hang it from a nail, or hook, with a three-pound weight attached to the butt end—an ordinary iron will do the trick. (See Fig. 2.) Allow the joint to hang for a period of at least sixty days. This

[*Continued on page* 158]

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Reconditioning Fishing Rod

[*Continued from page* 157]

procedure is an excellent reconditioner for it not only straightens out minor sets but also serves to cure any wet and soggy condition the rod joints may have developed.

Assuming that the rod has been adequately stripped and treated it must now be assembled again. First you may want to polish the ferrules and metal parts. This can be easily accomplished by rubbing them briskly with a thick paste made from water and powdered pumice. The pumice can be obtained in small quantities from any drug-store and is well suited to the purpose as it does not scratch the metal. Wash off the parts thoroughly after polishing and dry by holding them over the alcohol flame with a pair of pliers. Alcohol will not blacken the parts to be heated. Other types of flame might have a tendency to give off a sooty smoke.

To put on the ferrules first melt one end of the stick of ferrule cement and immediately apply it evenly and profusely to the rod joint end. Then hold the ferrule with a pair of pliers and heat it over the alcohol flame. It can then be easily forced over the cemented end of the joint. When the ferrule has cooled off and the cement has hardened, immerse the entire joint end in ice cold water. It will then be a simple matter to chip off the excess cement which has collected around the edges of the ferrule. Attach the tip-tops in the same manner but be certain that they are attached in line with the position of the guides when the latter are mounted.

The rod joints are now ready for a first coat of a weak solution of ½ marine spar varnish and ½ turpentine. This first coat acts as a general filler, sealing the pores of the bamboo. Have the mixture lukewarm so that it will flow as freely as possible. Brush it thoroughly into the cracks and seams. When finished, hang the rod joints in the middle of a dry room where no dust can get at them. Do not hang newly varnished joints near a flat surface or wall, as the varnish will run and cause lumps and air bubbles.

The color of your silk windings is optional. Almost any color or combination of colors can be used. It might be well to keep in mind that the windings on all fine makes of rods are added merely for the sake of appearance and are not essential. The addition of fancy silk windings, at various points throughout the rod, would of course have a tendency to stiffen its action somewhat. However, the number of windings, and their position is up to you. A size "A" silk thread, which is standard in all dry goods stores, is suitable for practically all types of rods.

Measure and lightly pencil the positions where you desire the snake guides to be mounted. Then secure one end of a guide in its position on the rod joint, with a rubber band. (See Fig. 3.) Catch the end of your silk thread under the rubber band and give the rod joint several turns,

Reconditioning Fishing Rod

finally bringing the thread around to the opposite end of the guide, at point "A" (See Fig. 4.), then wind the silk closely and evenly up the guide platform until nearly finished. Then make a loop from a separate piece of thread and lay it lengthwise and continue winding over the loop several times. (See Fig. 5.) Cut the winding thread and slip the loose end through the loop. (See Fig. 6) Then pull the loop, along with the thread end, through the winding thus making an invisible knot. (See Fig. 7.) Cut both excess thread ends close to the finished winding with a razor blade. For the other end of the platform, the ferrules, and at the tip-tops, the above instructions may be followed. Although it may seem difficult, a little practice will make an expert of you. For the fancy borders and windings which you might desire at various points, lay the thread loop as in Fig. 4, prior to winding, as the entire wrapping will consist of only six or seven turns around the rod.

The procedure of preserving the color of the silk windings prior to the final coats of varnish requires ordinary clear finger nail polish. Apply to the windings with a pipe cleaner. A regular color preservative can be purchased from your tackle dealer and is very effective. Before applying the preservative it is a good idea to run the windings through the alcohol flame very quickly in order to remove the fuzzy lint. Apply the preservative generously, making certain that the solution penetrates into the silk and the open corners next to the guides. When the windings have dried and the original color of the silk has returned, put on a second application.

There are several ways of varnishing a fishing rod successfully. One of the most important points to remember is that the rod joints must be thoroughly cleaned and free from particles of grit and dust. A good quality badger or a camel's-hair brush is also important. It must be well-washed in turpentine before using. A slow drying marine spar varnish of the best quality obtainable should be your choice. The varnish should be of a consistency which will flow freely. If it appears to be too thick, dilute it with turpentine. Heat the varnish until it is luke-warm and then apply a coat to the rod joints in even one-way strokes. Then hang the joints to dry for at least forty-eight hours. Keep in mind the importance of hanging newly varnished joints away from any wall. Suspend them from a hook in the middle of a clean dry room. Of course, do not attempt to varnish on a damp, or rainy day.

When you have applied three coats of varnish, drying thoroughly between coats, rub the joints down with wire wool. Use only the lightest gauge wool obtainable, preferably No. 000. Following the rubbing down wash the joints thoroughly with turpentine and apply the fourth and last coat of varnish.

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Craft Of Metal Spinning

[*Continued from page* 130]

a shoulder on it will provide the same type of equipment. If making your own, be *sure* to fasten the post securely to the horizontal bar so that there will be no chance of the bar turning.

With the metal disc securely chucked in the lathe, trim the edge of the disc with the diamond point tool. To trim, hold the tool securely, with the handle under the right arm and the tang of the tool in the left hand and resting on the tool rest bar. Carefully bring the tool forward until it makes contact with the rotating disc and gradually exert more pressure until the metal is trimmed to a true circle. Tilting the tool so that it makes a shearing cut rather than a scraping cut will give you a cleaner surface, will lessen the discs tendency to vibrate and will make the cutting edge of the tool last longer. It is a sensible practice to wear a light leather glove when trimming, for at times a thin ribbon of metal may slap your hand, which if unprotected, might be cut. Nonbreakable glasses such as grinders wear should be worn when trimming, for a particle of metal in an eye may mean the loss of that organ. Don't take chances.

To keep the tool from sticking and picking up particles of the metal being spun, some form of lubrication must be used. Although some spinners concoct their lubricant behind locked doors, with great secrecy and with incantations, an ordinary tallow candle will do the job nicely. Rotate the disc by hand and gently rub the candle against the side of the disc nearest the tail stock. Start at the center and work out to the edge. Only a light, thin coating is needed—the tendency of beginners is to over-lubricate, with the result that the surplus lubricant is thrown into their face and eyes; not harmful but a nuisance and unnecessary.

To spin, hold the point tool as shown. The handle of the tool is held between the arm and ribs and pressure is exerted by swinging the body. The point of the tool is placed under the center of the follow block and so that it just clears the follow block. The nose of the tool will point down and the tang of the tool will rest against the fulcrum pin.

With the lathe running at about 1300 r.p.m. bring the nose of the tool against the disc. As pressure is exerted against the tool handle, by the body, the metal will be seen to take the shape of the chuck at that particular point. By moving the nose of the tool in sweeping strokes down from the follow block and back up again, as the metal revolves, the disc will assume the shape of the chuck. From here on it is a repetition of this sweeping back and forth action of the tool that puts the metal down to the chuck. Keep the tool moving or you'll have rings in the piece you're spinning. Cultivate a smooth, even stroke and see how easily the metal flows from your tool.

The back and forth sweeping motion is to keep

Craft Of Metal Spinning

the metal flowing and also to keep it the same thickness throughout. If this motion is not used and the worker sweeps in one direction only, the metal will soon develop thin spots and a poor job results—if any at all results, for the piece may be thinned to such an extent that the metal will have holes pulled into it and your job is ruined. Release tool pressure occasionally to cool thrust bearings.

When you have spun the metal completely down against the chuck, trim off the surplus with the diamond point tool. Wipe off the remaining lubricant with a piece of cloth or paper and smooth the trimmed edge by using a piece of emery cloth as the lathe revolves. The spun shell is then ready to be removed from the chuck.

The candle cup is chucked, trimmed and spun and the edge smoothed with emery in the same manner as the base of the candle holder just described.

Place the candle cup and the base together, sweat solder them, buff the pieces thoroughly and carefully, using Tripoli first and finishing with 3X White Diamond for a brilliant gloss, and you have a pair of candle stick holders you'll be proud to see on the mantel or the dinner table.

Spinning adds much to the enjoyment of lathe work but don't take chances. Stop the lathe to reset the tool rest and stand to one side when you first start the lathe in case something is not right and the disc is thrown out. Always keep the nose of the tool pointing down so that if anything goes wrong the tool will be pulled down to the lathe bed instead of being thrown up at the worker. Wearing a light leather glove on the hand that holds the spinning tool against the fulcrum pin is a good habit to cultivate since this is the hand that is nearest the revolving metal.

BILL OF MATERIALS

1 pc. Maple 1x6" for base chuck
1 pc. Maple 1x1½" for candle cup chuck
1 pc. Maple ⅝x1" for follow block
2 pcs. .040" Copper 6" diameter (use either hot rolled or annealed)
2 pcs. .040" Copper 2½" diameter (hot rolled or annealed)
1 tallow candle for lubrication

Note: The metal discs listed above will be found to be sufficiently large for the beginner so that he will have a bit to trim off. For the experienced spinner however, the discs may be kept a bit smaller in size and still be of ample proportions.

A possible use for broken egg shells has been found—as a poultry feed, similar to oyster shell and high grade limestone.

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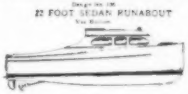

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"Midgie" Motor Scooter

[*Continued from page* 119]

the spring down and then put the retaining bolt in place. The sliding seat post has a slot cut as shown and the end closed with a small spacer tube which bears against the retaining bolt when the assembly is complete. This sliding seat post should be well greased at all times.

The front wheel must be bolted securely between the yoke which is made just wide enough to take the wheel and also to provide clearance for the bolts which pivot the yoke to the front forks. Note how the front forks are assembled in a reversed position.

The motor slides can now be made as shown in Fig. 6. The exact length of these pieces depends again on the motor used. The slide on the pulley side is bent as shown to provide anchorage for the clutch rod (clearly shown in the detail sketch, Fig. 3) and for the brake shoe. The motor bed irons or slides are then drilled to fit the motor bolts and also for the adjustment bolts which hold the slides down to the frame as shown in the cross section, Fig. 5.

Two pulleys are required for the motor shaft, preferably a 1½" low gear pulley and a 2½" high gear pulley. Both should be standard vee pulleys to take a ⅝" belt. The countershaft, of ½" diam. steel rod is fitted with four vee pulleys as shown. The sizes, working outwards from the frame should be 3", 3", 4" and 5" diam. The first pulley (nearest the frame) is later hooked up to the rear wheel drive pulley. The second 3" pulley acts as a brake drum and the two other pulleys represent the low and high gear drives.

The operation of the sliding motor bed is as follows: With the motor bolted down and the slides secured to the frame by means of the adjustment bolts mentioned earlier, the action of the brake and clutch pedal moves the entire motor back and forwards about 1½". This, on the forward motion, tightens the belt drive between the motor and the intermediate drive or countershaft. Reversing the movement, that is, disengaging the clutch, slackens the belt and engages the brake shoe in the braking pulley. It is very simple and very effective. By bending the clutch rod, as shown, it locks automatically when the clutch is fully engaged. The method of changing gear is of coufse a manual procedure and is arrived at by shifting the intermediate drive belt from low to high pulleys by hand. This can be effected when the motor is idling. It is not necessary to stop the motor to change the gearing ratio. The countershaft pulleys can be secured to the shaft by means of set screws.

The rear drive pulley is attached to the back wheel in the manner shown (Fig. 7). Exact dimensions cannot be given as there are many types of wheels and also the motor itself will have a good deal to do with the location of the pulley in relation to the wheel. The main thing is that the pulley be securely attached to the wheel and that the alignment with the intermediate drive pulley on the countershaft is perfect. The final drive may be effected with chain and sprockets if preferred and the parts are available but the belt drive indicated is about as simple and effective as can be desired.

Throttle control is managed through flexible cable and a lever attached to the right handlebar. The cable should be clipped to the fork head in several places as indicated. If possible attach throttle to a governor for an even starting and cruising speed. The gas tank can be made from almost any half gallon can but a good gas tank should contain both check valve and screen. Several coils should be put into the gas line to allow for the sliding motor.

Fenders and other accessories may be fitted to suit. A smart fairing or body around the motor can be worked out to the lines suggested in Fig. 1, but is not essential. If any bodywork is undertaken care must be given to the provision for adequate cooling. Exhaust pipe arrangement is up to the builder but in general it may be said that the exhaust gases should be led as far back as possible. Finish with a bright coat of enamel and your scooter is ready for the road.

Candy And Nut Bucket

[*Continued from page* 104]

the screw holes, leaving perhaps 1½ or 2 inches in diameter which is later cut through with the hand saw. If the waste is completely cut through with the lathe running, the bucket may fly off on the floor with disastrous results.

To provide the "ears" set up the bucket on the band saw table with a strip of wood under the bottom to make the center line through the bucket parallel with the saw table to insure a square cut across the top. Lay out the "ears" in pencil on opposite sides and run the band saw blade through the side walls ¼-inch above the shoulder, then with a small key hole saw, finish the rough sawing and finish with a knife and sandpaper. The holes through the "ears" can be made with a small bit and then trimmed to shape with a knife. Finish should be a double coat of varnish or a good spray coat of clear lacquer. Figure 5 shows the "ear" layout, figure 6 "ear" and shoulder details.

The cover can be of either metal or wood. If you have a lathe which will stand up under metal spinning, the neatest job will be a copper lid, spun to fit with a bell about 1-inch high. Lacking this you can more easily turn a wood cover to match, curved as shown, ½ or ⅜-inch thick, which will seat loosely. The knob in either case should be of wood, fastened with a screw with washer under the head, turned through from the under side.

This bucket or tub makes an ideal gift.